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TECHNICAL REPORT 3075

DEVELOPMENT
OF THE
DEMOLITION KIT, BLASTING, XM175

EDMUND DEMBERG

AMCMS 5520.12.418 BO

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SEPTEMBER 1963

PICATINNY ARSENAL
DOVER, NEW JERSEY

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BY

EDMUND DEMBERG

AMCMS 5520.12.418B0

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SECTION I

INTRODUCTION

The purpose of this investigation was to develop a kit, consisting of four shaped charges and non-electric priming accessories for producing pilot holes in frozen soil, suitable for hand driving anchoring stakes for the Littlejohn launcher. It was necessary to qualify the developed kit and its components as safe for handling, storing and shipping.

The need for such a kit was established and the investigation started by Rock Island Arsenal, Rock Island, Illinois. The Rocket Launcher, XM34, for the Phase II Littlejohn System, was designed by Rock Island Arsenal, Research and Development Division, primarily to accurately launch the Littlejohn rocket (Reference 1). The rocket requires a stable platform for accurate launching. A major problem encountered with the Phase II Littlejohn system was the inability to anchor the launcher simply and quickly in Arctic regions (Reference 2). In an effort to solve the problem, studies were instituted to develop an effective anchoring method without the use of elaborate support equipment (Reference 3).

One area of study indicated a satisfactory method of tying down the Littlejohn launcher in Arctic terrain (Reference 4). Although normal tie-down stake driving operations are nearly impossible in Arctic regions, it was found that they could be effected if pilot holes could be made in the frozen ground. To achieve the pilot hole without using elaborate support equipment, it was proposed that a shaped explosive charge be used. Preliminary investigations and feasibility studies indicated that this approach was highly satisfactory. A commercially available shaped charge, containing approximately 2-3/4 oz of 95/5 RDX/Wax, produced acceptable pilot holes when tested in the Arctic (Reference 5). The results warranted the investigation of a shaped charge which would meet military requirements but retain the same or superior lancing characteristics as the tested item.

In October 1961, a representative of Picatinny Arsenal visited Rock Island Arsenal to discuss the problem. This discussion and subsequent communications resulted in Picatinny Arsenal being designated the responsibility of developing a kit for producing acceptable pilot holes in frozen ground and Arctic terrain (Reference 6).

SECTION II

SUMMARY

The development of the XM175 Blasting Demolition Kit was completed by Picatinny Arsenal in April 1962. The kit consists of four XM106 Demolition Charges, a single length of detonating cord strung through transverse holes in each charge and non-electric priming accessories. The XM175 Blasting Demolition Kit produces pilot holes in frozen soil acceptable for the hand driving of anchoring stakes for the Littlejohn launcher.

A unique packaging arrangement enables the kit to be unpacked, assembled, positioned and fired, by a User wearing Arctic mittens, in a matter of minutes. No special training is required to function the kit correctly.

Performance of the MX175 Blasting Demolition Kit was satisfactory during engineering tests and the kit was released to Rock Island Arsenal in April 1962. The test data shows the XM175 Kit is reliable and safe for handling by troops. It complies with the necessary military standard tests and I.C.C. storage, handling and shipping regulations.

SECTION III

CONCLUSION

The Demolition Kit, Blasting, XM175 is a safe and reliable item, for producing holes in frozen ground acceptable for the hand driving of anchoring stakes for the Littlejohn launcher. The kit is a light, compact item that can be properly functioned by a User wearing Arctic mittens. The kit meets I.C.C. regulations and military standard tests regarding storing, handling and shipping.

SECTION IV

RECOMMENDATIONS

1. The Demolition Kit, Blasting, XM175 should become part of the Littlejohn system for use in anchoring the launcher in Arctic terrain.
2. The kit or variations of the kit should be considered for solving Ordnance Problem 143, (U.S. Army Problem Guide Vol IV 1 July 1960) Subject: Develop a technique for anchoring rocket or missile launchers.

SECTION V

STUDY

The Demolition Kit, Blasting, XM175 consists of four XM106 Demolition Charges and priming accessories assembled into a unique package. Each kit contains five inner boxes: four containing one shaped explosive charge each and detonating cord, while the fifth contains the initiating components. Each of the four inner boxes has a 6-inch square base and is made of material that produces no dangerous fragmentation when the shaped charges are fired. Each box holds the shaped charge in such a manner that its base is at the desired stand-off distance from the ground when unpacked for use in the field. The box contains the proper amount of detonating cord so the shaped charges can be laid out to fit a schematic diagram inclosed in each package. The cord is coiled in the box and uncoils as the box is opened and positioned for firing. Each box is opened by pulling off a strip of tape with a tab on one end for easy removal. The package comes to the User with the cord already strung through the shaped charge items. One end of the detonating cord is crimped into an adapter, especially designed for this kit. This adapter simplifies the attachment of the detonating cord to the initiation assembly in the field. The whole package is so designed that it can be unpacked, assembled, positioned and fired by a User wearing Arctic mittens in a matter of minutes. The User requires no special training to use the kit.

The XM175 Demolition Kit weighs approximately 26 lbs. and has outside dimensions of 17-11/16" x 14-3/8" x 10-25/32". A wooden crate is used to provide the desired protection for shipment and storage. The contents of the outer wooden crate are enclosed in a barrier material bag for waterproofness. Although the bag permitted water to enter during a 24-hour submersion test, the kit functioned satisfactorily. If properly sealed, no water should reach the inner cartons. The kit was not effected by the transportation vibration test and is safe for proper shipping and handling. It has an I.C.C. classification of High Explosive - Class A and a classification of Class 9 in accordance with the Ordnance Safety Manual.

The shaped charge, designated as Charge, Demolition XM106, four of which are in the kit, consists of a 75-gram shaped explosive charge of 95/5, RDX/wax. A thin 80° angle copper cone and a 12-grain RDX booster are imbedded in opposite ends of the charge. The assembly, except for the cone, is inclosed in a bakelite case. Detonating cord is strung through a transverse hole located in the bakelite case just above the booster.

Functioning tests with the XM106 Demolition Charges produced holes in frozen ground into which the Littlejohn restraining stake could be quickly

and easily driven with a sledge hammer. The XM106 Demolition Charges, singly or in multiples of four, were initiated with detonating cord. They are safe for handling by troops as indicated by the failure of the rifle bullet impact, crush or cook-off to produce any evidence of explosion. Tests indicated the XM106 Demolition Charge was not adversely effected by salt spray, cycling between temperature extremes (-65°F and 160°F) and storage at -65°F.

Incompatibility of some ingredient with the explosive charge (RDX/wax, 95/5) in the XM106 Demolition Charge was indicated by two non-firings after storage at 160°F for 30 days and a low flash point of 200°F obtained in one of the cook-off tests. The explosive charge was compatible with the cement (DuPont No.4678) used in the tested items. The other ingredient that could be incompatible with RDX is the wax used in the tested items. The wax specified for use in the demolition charge is specified for use with RDX in specification MIL-R-13738 (ORD), November 1954. Therefore, no incompatibility should exist if the XM106 Demolition Charges are manufactured according to the prepared drawings XP-117070 to XP-117074. These drawings and a subsequent specification should establish a standard for the manufacture of the XM106 Demolition Charges to assure an adequate level of performance.

When the XM106 Demolition Charge was fired over permafrost at a 3-1/2-inch standoff during Arctic test, deeper holes were made than with commercial charges tested under similiar conditions (Reference 4). This was due to the larger explosive charge in the XM106 Demolition Charges, 75 grams as compared to 55 grams in the commercial item tested. The deeper holes were superior for the hand driving of the Littlejohn stake.

The satisfactory performance of the XM106 Demolition Charge during engineering tests warrants its use in the XM175 Blasting Kit.

Drawings and pictures of the kit and its components are in Appendix B. The prescribed procedure for operating the kit (contained in each kit and used in the engineering tests) is described in Appendix D.

To alleviate the expense and time consuming operation of preparing frozen ground for each test, it was decided to fire the kit and/or charges into #1020 steel plates. It was necessary to establish a correlation factor between penetration depths in frozen ground and #1020 steel to correlate this with previous data. To accomplish this objective, a compilation was prepared of penetrations obtained when XM106 Demolition Charges were fired at a 3-1/2-inch standoff into #1020 steel plates and into frozen ground.

The geometric means of the penetrations were determined (Reference 10). One inch penetration in #1020 steel was equivalent to 2-3/5 inches penetration in frozen ground. The compilation and graphs used in the determination are shown in Table 4 and Figure 45 and 46.

A literature review revealed 15 inches was a minimum penetration in frozen ground suitable for the hand driving of the stake for anchoring the Littlejohn launcher (Reference 2, 3, 4, 5 and 8). This is equivalent to a penetration in #1020 steel of 5-10/13 inches.

In engineering tests described on subsequent pages, the functioning of the XM175 Demolition Kit was considered satisfactory when all four XM106 Demolition Charges fired and produced holes in frozen ground (or equivalent holes in #1020 steel) suitable for the hand driving of the Littlejohn launcher retainer stake. A functioning test of the XM106 Demolition Charge was satisfactory when it produced suitable holes in frozen ground (or equivalent holes in #1020 steel).

Engineering Test Results And How Obtained

Arctic Firing

Fifteen XM106 Demolition Charges were fired at Fort Greely, Alaska, at temperatures from 0° to 35°F. Fourteen charges were fired with detonating cord at a 3-1/2-inch standoff into the ground. One of the charges was fired with the cone of the charge directed at a 3/4-inch thick, plywood target, 20 feet away. Charge 14 was fired into the hole made by Charge No. 4.

There were no noticeable effects on the items tested due to the Arctic climate. All charges functioned and produced holes in the permafrost of not less than 18 inches and averaging 21-1/2-inches deep. The entrance hole diameters were approximately one inch. No difficulty was experienced in driving the Littlejohn stake in two attempts. The results obtained in the Arctic tests are listed in Table 1 (Reference 8).

Functioning At High And Low Temperatures (160°F and -65°F)

Five and 25 XM106 Charges were conditioned for 48 hours and fired at 160°F and -65°F, respectively. All charges were initiated with detonating cord at a 3-1/2-inch standoff over #1020 steel and produced satisfactory penetrations (Table 2).

Crush

Six XM106 Demolition Charges were placed in various positions between steel plates and a 150-lb steel weight and dropped from a height of nine feet onto the upper plate. The charges were crushed with no evidence of explosion.

Multiple Initiation

A 50-foot length of detonating cord was strung through the transverse holes in the necks of four XM106 charges. In five separate tests, the detonating cord initiated the four shaped charges. The charges were fired at a 3-1/2-inch standoff over #1020 steel and produced satisfactory penetrations (Table 3).

Rifle Bullet Test

Ten XM106 Charges were subjected to the impact of caliber .50 bullets fired from a distance of six feet. The bullets were fired twice into each of the following positions of the charges: neck, copper cone, side, top and booster. There was no evidence of explosion in any of the ten tests.

Cook Off

Five XM106 Demolition Charges were heated as rapidly as possible by winding 500 watt Cal-Rod heating units around the charges and applying the required voltage. No attempt was made to monitor the temperature of the charges but rather to determine if the items could be exploded by heat. These items burned without explosion.

Additional items were placed in an oven and gradually heated. The temperature was monitored by thermocouples cemented to the copper cones of each charge. The four additional tested charges burned without explosion. The results were:

<u>ITEM NO</u>	<u>RATE OF HEATING, °F/MIN</u>	<u>FLASHING POINT, °F</u>
1	14.5	340
2	5.75	305
3	10.75	335
4	7.00	200

Average Flashing Point 295°F

Low Temperature Storage

Twenty-five XM106 Charges were stored at -65°F for 30 days. Upon completion of the test, the conditioned items were visually examined and fired at ambient temperature, with detonating cord at a 3-1/2-inch stand-off, over #1020 steel plates.

There were no visual effects of the conditioning on the 25 charges. All the charges fired and produced satisfactory penetrations (Table 2).

High Temperature Storage

Five XM106 Demolition Charges were stored at 160°F for 30 days. Upon completion of the test the charges were visually examined and fired at ambient temperature, with detonating cord at a 3-1/2-inch stand-off, over #1020 steel plates

The cement around the copper cones of the five charges was blackened and each of the bakelite cases had darkened considerably. Soot was present on all five items. When these charges were initiated with detonating cord, two of the charges failed to explode.

The conditioning and firings were repeated with 25 additional charges. These charges emerged from the 160°F storage with no visual effects. The 25 charges were initiated with detonating cord at a 3-1/2-inch stand-off over #1020 steel. All charges exploded and produced satisfactory holes (Table 2).

JAN Cycling

Five XM106 Charges were temperature-cycled according to the procedure described in MIL-STD-304.

There were no visual effects due to the JAN Cycling on the five charges. The charges functioned after the test and produced satisfactory penetrations (Table 2).

Lethal Range of Fragments and Blast

Ten XM106 Demolition Charges were fired in normal position. Two firings were over rocky terrain, four firings over frozen ground and four charges at one time in positions used to secure the Littlejohn launcher. The rocky terrain was simulated by covering the ground with five to six inches of gravel and the frozen ground was obtained by freezing the immediate area with dry ice.

Fragmentation and blast patterns around charges positioned horizontally were obtained by firing the charges above one-foot -square steel plate. The steel plate was utilized to provide uniformity and for ease and accuracy positioning. The fragment targets and gages were placed along lines from the center of the charge with the direction being measured from the axis of the charge. Zero degree is taken to be the direction of the charge axis on the jet end. Three items were fired with the targets along 0° , and four with the targets along 45° .

Peak-pressures and impulses were measured at 90° , 45° and 15° . The shock-wave velocity for the peak-pressure determination was measured with six piezo electric gages covering the range from approximately 1.5 - 15.5 feet from the charge. The impulse data was measured with four impulse gages, two at three feet and two at seven feet. The effects of fragmentation were measured with twelve targets, each consisting of a five-foot square of brown wrapping paper taped to steel frames. These targets were placed at distances of 10, 20 and 40 feet from the charges at 90° intervals around the charges.

Holes produced in targets by fragments and debris resulting from firings of the XM106 Demolition Charges are tabulated in Table 5. The peak-pressures and impulses obtained in the firings, versus the direct distances are plotted in Figures 47-49 (Reference 9).

Salt Spray

Five XM106 Demolition Charges were exposed to salt spray according to the procedure described in MIL-STD-306. Upon completion of the test, the items were examined and functioned.

There were no visible effects to the five exposed items, other than small deposits of salt on the copper cones. The charges all fired when initiated with detonating cord. The penetrations in #1020 steel were satisfactory (Table 3).

Compatibility of RDX/Wax and DuPont Cement No. 4678

The RDX/wax and Cement (DuPont No 4678) used in the demolition charges tested were exposed to 100°C for 40 hours in intimate contact according to the procedure described in Picatinny Arsenal Technical Report FRL-TR-25. No gas was evolved.

Propagation Through The XM38 Adapter

The narrow end of priming Adapter, XM38, was crimped onto a length of detonating cord over a relay assembly. The blasting cap of the ignitor assembly (Dwg XP 117799, Appendix B) was inserted into the adapter. An M60 Igniter was fired and the detonating cord was initiated after a 40-second delay. The propagation through the XM38 Adapter was satisfactorily repeated in five separate tests.

Functioning Test of Demolition Kit

Five XM175 Kits were fired in accordance with the procedure in Appendix D. The kits were fired into frozen ground or #1020 steel plates. The frozen ground was prepared by filling containers with soil, saturating the soil with water and maintaining the containers and contents for 48 hours at -65°F.

Four of the five XM175 Kits functioned satisfactorily, producing four holes in frozen ground (or #1020 steel). In the fifth kit, two of the four shaped charges and part of the detonating cord failed to explode. The two charges functioned when the detonating cord was re-initiated. It was determined that failure of the kit to perform satisfactorily was due to a closed loop in the detonating cord, which caused a cut-off in the explosive train. This situation does not occur if the prescribed procedure is accurately followed. The penetrations obtained were all satisfactory (Table 3).

Transportation Vibration

One XM175 Kit was secured in a Naval Ordnance Laboratory Vibrator, Type 2, and tested according to the procedure described in MIL-STD-353. Upon completion of the test, the kit was examined and functioned.

There were no visible effects on the XM175 Kit due to the transportation vibration test. When the kit was functioned it produced four acceptable holes in #1020 steel plates (Table 3).

Waterproofness

An XM175 Demolition Kit was completely submerged in one foot of water for 24 hours. The kit was examined and functioned upon completion of the test.

Visual examination after the test disclosed the inner cartons of the

kit were wet. The kit, however, functioned satisfactorily according to prescribed procedure. The penetrations obtained are in Table 3.

Arctic Functioning of Kit

The initial evaluation by the U.S. Army Arctic Test Board was conducted on one demolition kit containing detonating cord complying with MIL-C-17124A, Type I, Class D. It was found that the detonating cord became stiff in cold weather preventing proper positioning of the shaped charges. This caused improper functioning of the demolition kit. This deficiency was corrected by employing a detonating cord containing a flexible explosive core encased in a nylon sleeve. The flexible explosive core complies with MIL-E-46676(MU).

The demolition kit containing the flexible explosive detonating cord was retested in cold weather (-65°F) and found satisfactory. The cord remained flexible and enabled the shaped charges to be properly positioned.

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APPENDICES

APPENDIX A

TABLES

TABLE 1
RESULTS OF ARCTIC FIRINGS OF THE XM106
DEMOLITION CHARGES

<u>Number</u>	<u>Firing Method</u>	<u>Soil Type</u>	<u>Penetration of 1/8" Diameter Rod</u>	<u>Remarks</u>
1	a	b	19-1/2	20 seconds to drive stake 6"
2	a	b	22	
3	a	b	19-1/2	
4	a	b	18	
5	c	d	23-3/4	10 seconds to drive stake 6"; 20 seconds all the way
6	e	f	20-1/2	
7	e	f	24-3/4	
8	e	f	20-1/2	
9	e	f	21	
10	g	f	23	
11	g	f	22	
12	g	f	21-1/2	
13	g	f	25-1/2	
14	h	i	j	
15	k	-	-	Many holes in target over a 2 foot-diameter circle

- a - Blasting machine, wire, E2B cap, detonating cord, 3-1/2" stand-off.
Four perforators fired at one time.
- b - Soil consisted mainly of gravel.
- c - Blasting machine, wire, E-2B cap, 3-1/2" stand-off.
- d - Soil consisted mainly of river silt.
- e - Burning cigarette, blasting time fuse, J-1 nonelectric cap, detonating cord paper standoff cones. Four perforators fired at one time. UK coupler in middle of detonating cord.
- f - Soil consisted of river sand and clay with little gravel.
- g - M2 fuse lighter, blasting time fuse, J-1 nonelectric cap, detonating cord, 3-1/2" standoff. Four perforators fired at one time. UK coupler between J-1 and cord.
- h - M2 fuse lighter, blasting time fuse, J-1 nonelectric cap, 3-1/2" standoff.
- i - Soil same as f but round fired over a hole made by a previous shot.
- j - Hole 11-1/2" deep before firing perforator 14. Hole 22" deep after firing perforator 14. Diameter of hole increased from approximately 1" to 2".
- k - M2 fuse lighter, blasting time fuse, J-1 nonelectric cap. Perforator on a wooden table in horizontal position; 3/4" plywood target 40 feet away.

TABLE 2

PENETRATIONS OBTAINED FROM XM106 DEMOLITION CHARGES
STORED AND FIRED AT TEMPERATURE EXTREMES

<u>Test Designation</u>	<u>Frequency</u> ¹	<u>Depth of Penetration</u> ² <u>in #1020 Steel, inches</u>	<u>Remarks</u>
Low Temperature Storage			
	1	6	Items were
	1	6-1/2	conditioned at
	2	6-3/4	-65°F for 30
	7	7	days and fired
	2	7-1/8	ambient temp-
	4	7-1/4	erature
	7	7-1/2	
	1	7-3/4	
High Temperature Storage			
	1	6	Items were
	3	6-1/2	conditioned at
	2	6-3/4	160°F for 30
	12	7	days and fired
	9	7-1/2	at ambient
	1	7-3/4	temperature

TABLE 2 (CONTINUED)

PENETRATIONS OBTAINED FROM XM106 DEMOLITION CHARGES
STORED AND FIRED AT TEMPERATURE EXTREMES

<u>Test Designation</u>	<u>Frequency</u> ¹	<u>Depth of Penetration</u> ² <u>in #1020 Steel, inches</u>	<u>Remarks</u>
Functioning at Low Temperature	3	6-3/8	Items were
	2	6-1/4	conditioned at
	5	7-1/2	-65°F for 48
	4	6-3/4	hours
	2	7	
	2	7-1/8	
	4	7-1/4	
	1	7-3/4	
	1	7-7/8	
	1	8-1/8	
Functioning at High Temperature	1	6-1/2	Items were
	3	7-1/4	conditioned at
	1	7-1/2	160°F for 48 hrs

1 Frequency represents the number of times the same depth of penetration was recorded. The entry hole diameters were all 3/4 inch.

2 Charges were all fired with detonating cord into #1020 steel at a 3-1/2 inch stand-off.

TABLE 3

PENETRATION OBTAINED FROM XM106 DEMOLITION CHARGES
FUNCTIONED DURING TESTING PROGRAM

<u>Test Designation</u>	<u>Test No.</u>	<u>Package No.</u>	<u>Depth of Penetration, Inches</u>		<u>Remarks</u>
			<u>Frozen Ground</u>	<u>#1020 Steel</u>	
Functioning	1	1	15		Average diameter of initial hole in the frozen ground was 1.1 inch
		2	16		
		3	15-1/2		
		4	17		
	2	1	17-1/2		
		2	16-1/2		
		3	19		
		4	16-1/2		
	3	1	17-1/2		
		2	17-1/2		
		3	17-1/2		
		4	17-1/2		
	4	1	17		
		2	17		
		3	17		
		4	17		

TABLE 3 (CONTINUED)

PENETRATION OBTAINED FROM XM106 DEMOLITION CHARGES
FUNCTIONED DURING TESTING PROGRAM

<u>Test Designation</u>	<u>Test No.</u>	<u>Package No.</u>	<u>Depth of Penetration, inches</u>		<u>Remarks</u>
			<u>Frozen Ground</u>	<u>#1020 Steel</u>	
	5	1		6-3/4	Diameter of
		2		7	initial hole in
		3		7-1/2	steel was
		4		7-1/2	consistently 3/4"
Transportation Vibration	1	1		7-1/8	
		2		7	
		3		7-1/8	
		4		7-1/8	
Waterproofness	1	1		7	
		2		6-3/4	
		3		7-1/2	
		4		7-1/8	
Salt spray	1			6-1/4	
	2			6-7/8	
	3			6-1/2	
	4			7-1/4	
	5			7-1/8	
Multiple	1	1		7-1/8	All charges

TABLE 3 (CONTINUED)

PENETRATION OBTAINED FROM XM106 DEMOLITION CHARGES
FUNCTIONED DURING TESTING PROGRAM

<u>Test Designation</u>	<u>Test No.</u>	<u>Package No.</u>	<u>Depth of Penetration, Inches</u>		<u>Remarks</u>
			<u>Frozen Ground</u>	<u>#1020 Steel</u>	
Ignition		2		6-2/3	appeared to
		3		7-1/4	detonate simult-
		4		6-1/2	aneously.
	2	1		6-3/4	Charges were
		2		7-1/4	strung approx.
		3		7-3/4	6 ft. apart
		4		6-3/4	
	3	1		6-3/4	
		2		8	
		3		7	
		4		6-1/2	
	4	1		7-1/2	
		2		7-1/2	
		3		7-3/4	
		4		7	

TABLE 3 (CONTINUED)

PENETRATION OBTAINED FROM XM106 DEMOLITION CHARGES
FUNCTIONED DURING TESTING PROGRAM

<u>Test Designation</u>	<u>Test No.</u>	<u>Package No.</u>	<u>Depth of Pene- tration, inches</u>		<u>Remarks</u>
			<u>Frozen Ground</u>	<u>#1020 Steel</u>	
JAN Cycle	5	1		7	
		2		6-1/4	
		3		4-3/4	Item bifurcated,
		4		6-3/4	producing two ini-
	1			7-1/8	tial holes in the top
	2			7-1/8	steel plate, each
	3			6-1/2	approximately 3/4
	4			6-1/2	inches in diameter.
	5			6-1/2	

TABLE 4

COMPOSITE OF PENETRATION RESULTS TO DETERMINE
RATIO OF FROZEN GROUND TO #1020 STEEL

PENETRATIONS IN FROZEN GROUND

<u>Depth of Penetration, Inches</u>	<u>Midpoint, Inches</u>	<u>Frequency</u>	<u>Cumulative Frequency, Percent</u>
15-16	15-1/2	3	7.1
16-17	16-1/2	4	16.7
17-18	17-1/2	10	40.5
18-19	18-1/2	5	52.4
19-20	19-1/2	6	66.7
20-21	20-1/2	4	76.2
21-22	21-1/2	3	83.3
22-23	22-1/2	3	90.5
23-24	23-1/2	2	95.2
24-25	24-1/2	$\frac{2}{42}$	100.0

PENETRATION IN #1020 STEEL

<u>Depth of Penetration, Inches</u>	<u>Frequency</u>	<u>Cumulative Frequency, Percent</u>
4-3/4	1	0.9
5	0	-

TABLE 4 (CONTINUED)

COMPOSITION OF PENETRATION RESULTS TO DETERMINE
RATIO OF FROZEN GROUNDS TO #1020 STEEL

PENETRATION IN #1020 STEEL

<u>Depth of Penetration, Inches</u>	<u>Frequency</u>	<u>Cumulative Frequency, Percent</u>
5-1/4	0	-
5-1/2	0	-
5-3/4	0	-
6	3	3.1
6-1/4	6	8.7
6-1/2	10	17.4
6-3/4	16	31.3
7	32	59.1
7-1/4	22	78.3
7-1/2	17	93.0
7-3/4	5	97.4
8	2	99.1
8-1/4	$\frac{1}{115}$	100.0

TABLE 5
TABULATION OF TARGET HOLES PRODUCED BY XM106 DEMOLITION CHARGE¹

Direction of Fire	Terrain	Angle	Distance Of Targets From Charges, In Feet															Comments
			10			20						40						
			Hole Sizes, Inch			Hole Sizes, Inch			Hole Sizes, Inch			Hole Sizes, Inch			Hole Sizes, Inch			
			1/2	1/4	1/8	1/16	Pin	1/2	1/4	1/8	1/16	Pin	1/2	1/4	1/8	1/16	Pin	
Into Ground	Gravel	90°	4	3	11	---	121	---	---	---	---	38	---	---	---	---	---	Rocks stuck in 10 ft target
Into Ground	Frozen Ground	90°	1	7	1	9	192	---	1	1	---	33	---	---	---	---	---	Rocks stuck in 20 ft target
At Center of Target	-----	0°	22	10	3	24	18	8	4	6	---	24	2	3	1	---	12	2-1/2" diam. hole at 0° in 10 ft target, 6" hole at 0° in 20 ft target 2-1/2" hole at 0° in 40 ft target
At Center of Target	-----	90°	---	3	8	2	245	---	---	---	---	13	---	---	---	---	---	
At Center of Target	-----	180°	4	3	---	---	19	---	---	---	---	14	---	---	---	---	---	
45° with respect to Paper Target	-----	135°	4	21	60	114	218	1	4	14	16	30	---	1	---	---	2	
45° with respect to Paper Target	-----	45°	---	1	24	46	61	---	3	9	18	12	---	2	---	4	---	Rocks stuck in 20 ft target
Reference 8.																		

¹ Reference 8.

APPENDIX B

FIGURES

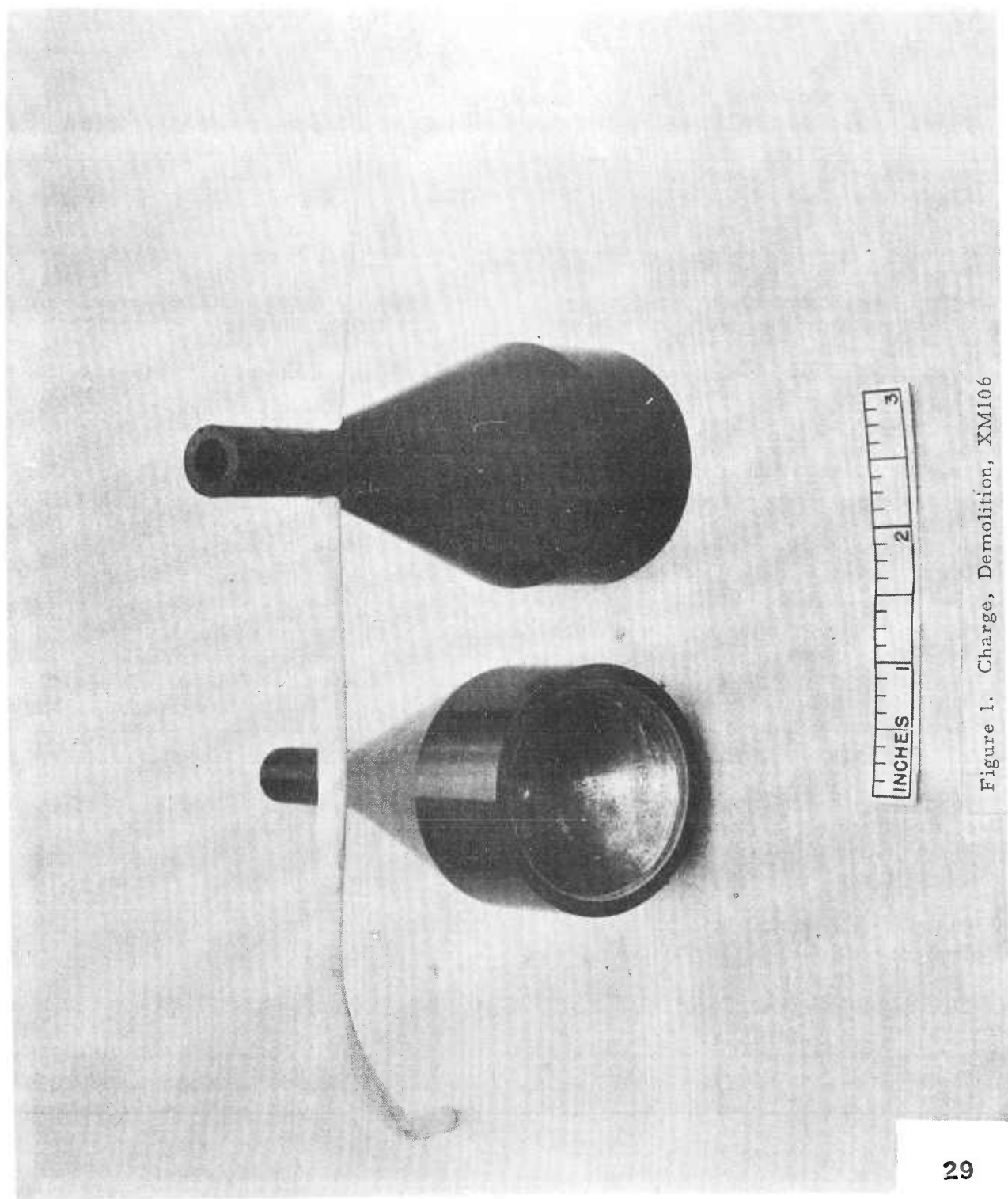


Figure 1. Charge, Demolition, XM106

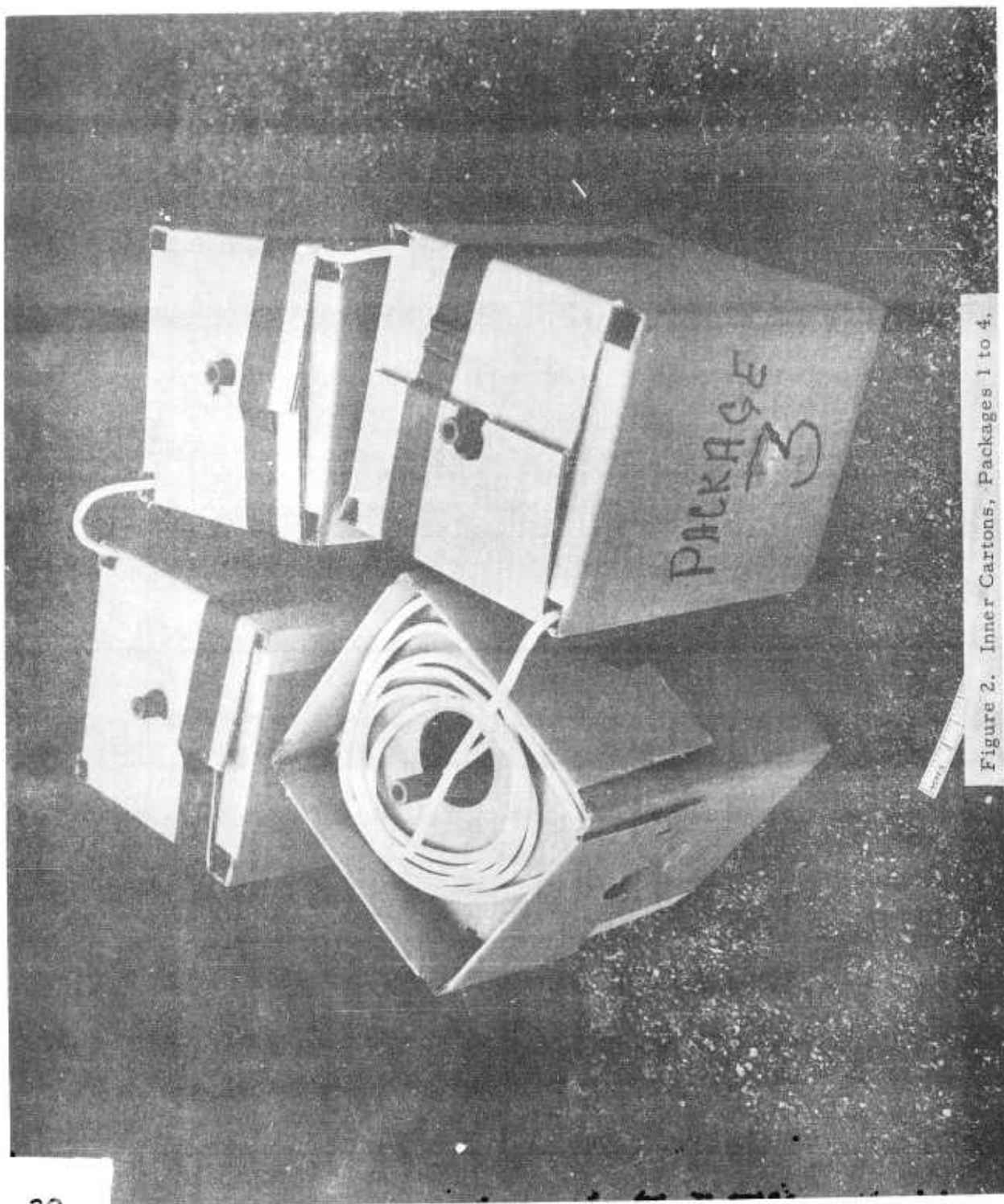


Figure 2. Inner Cartons, Packages 1 to 4.

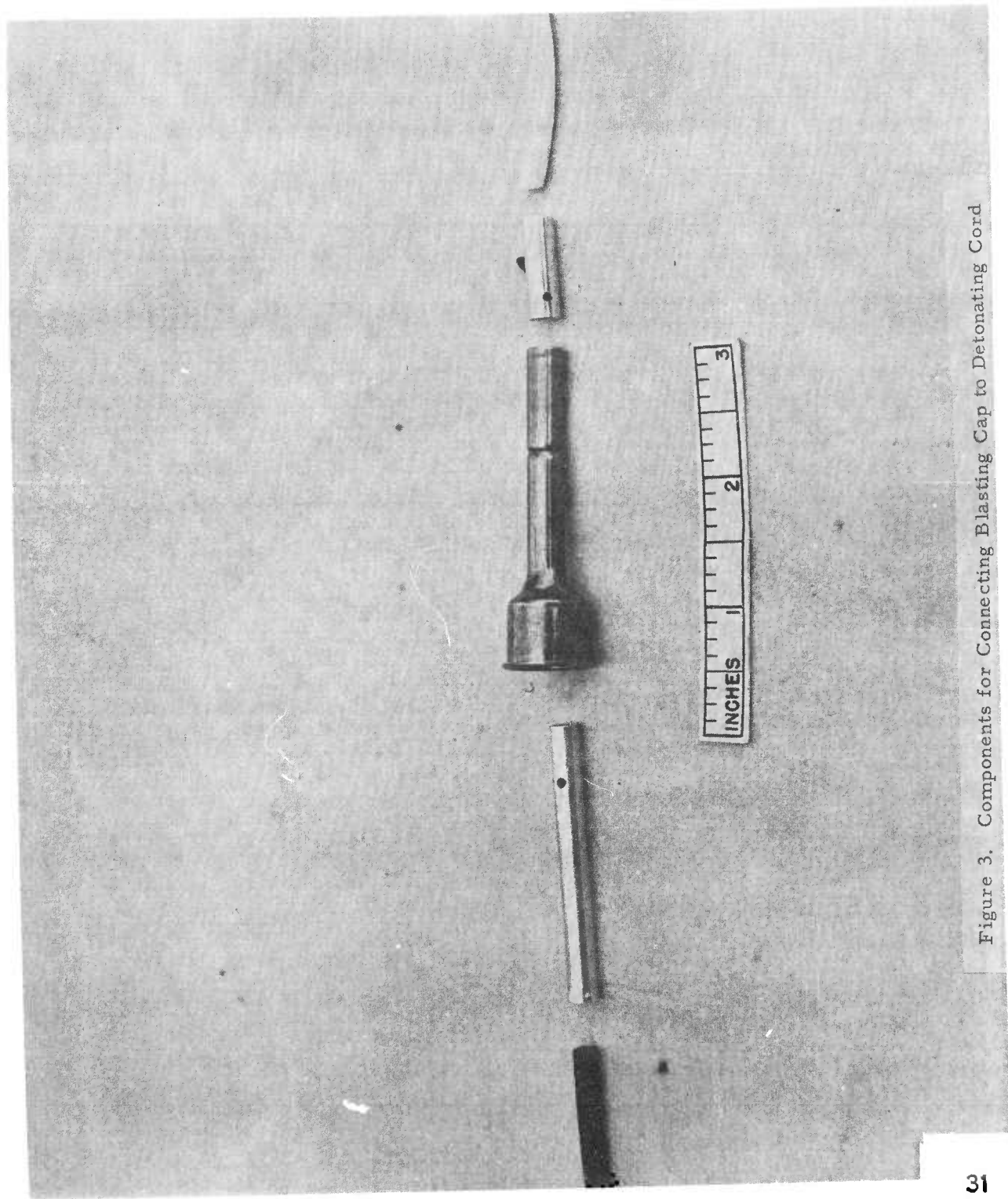


Figure 3. Components for Connecting Blasting Cap to Detonating Cord

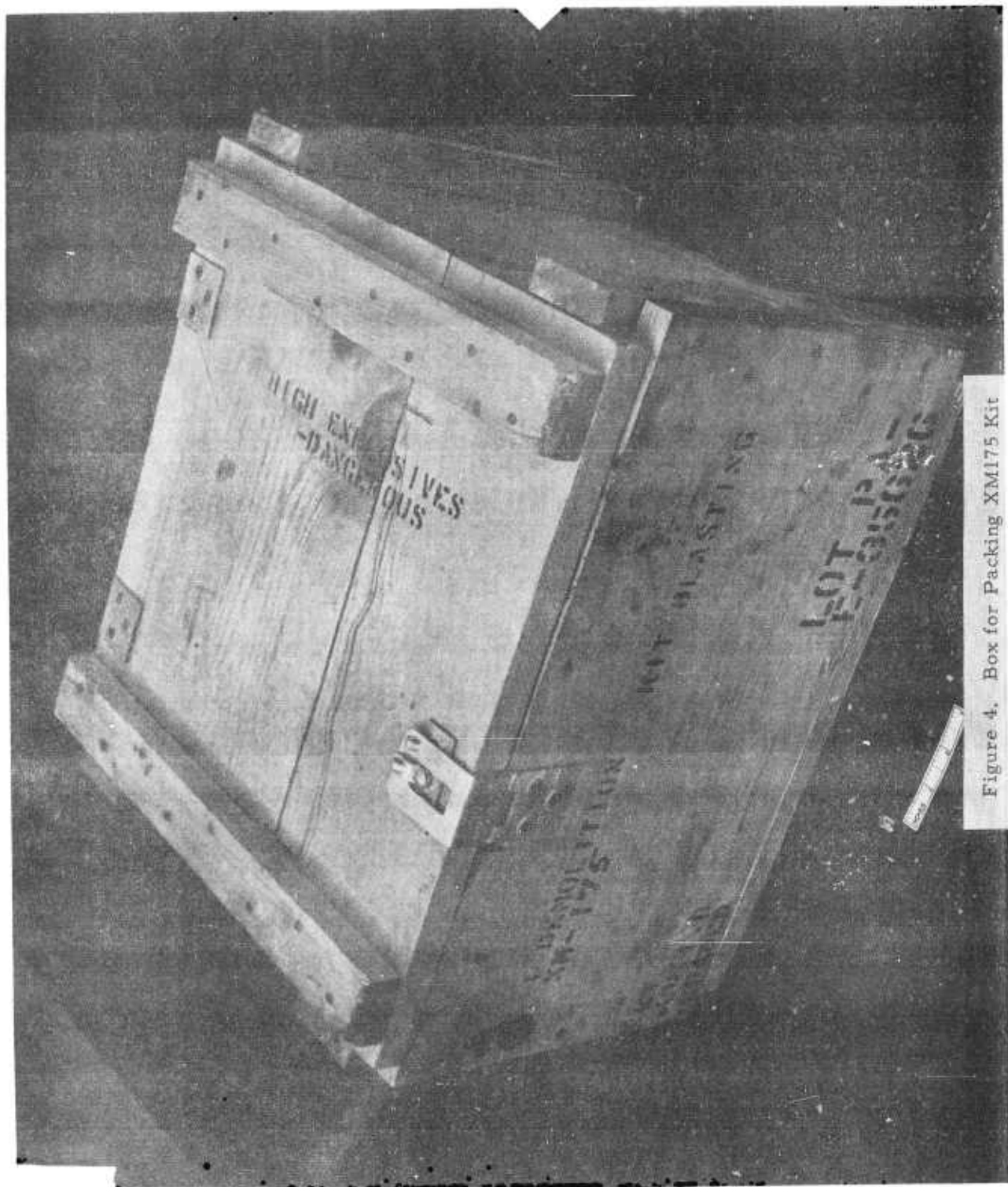


Figure 4. Box for Packing XM175 Kit



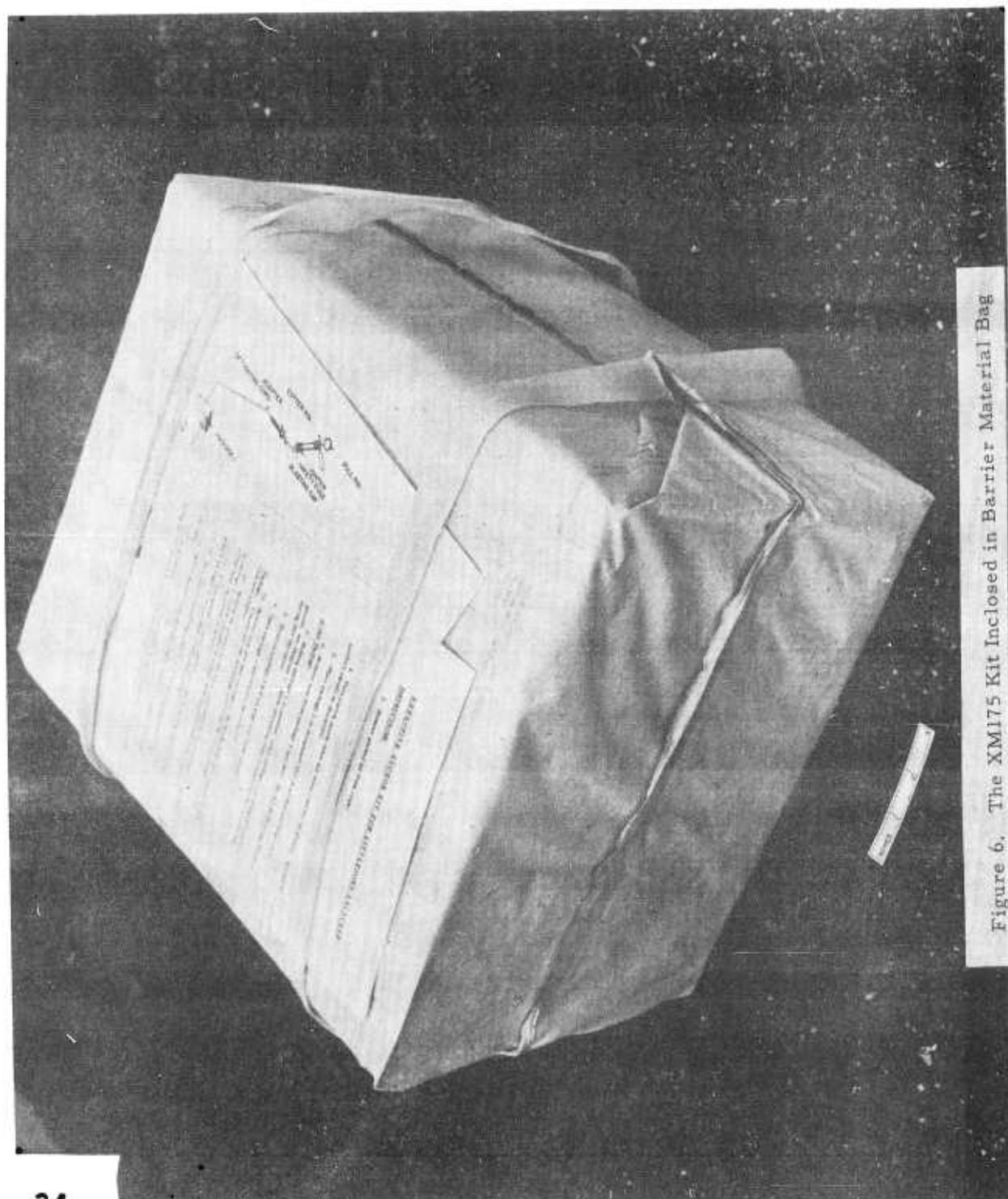


Figure 6. The XM175 Kit Inclosed in Barrier Material Bag

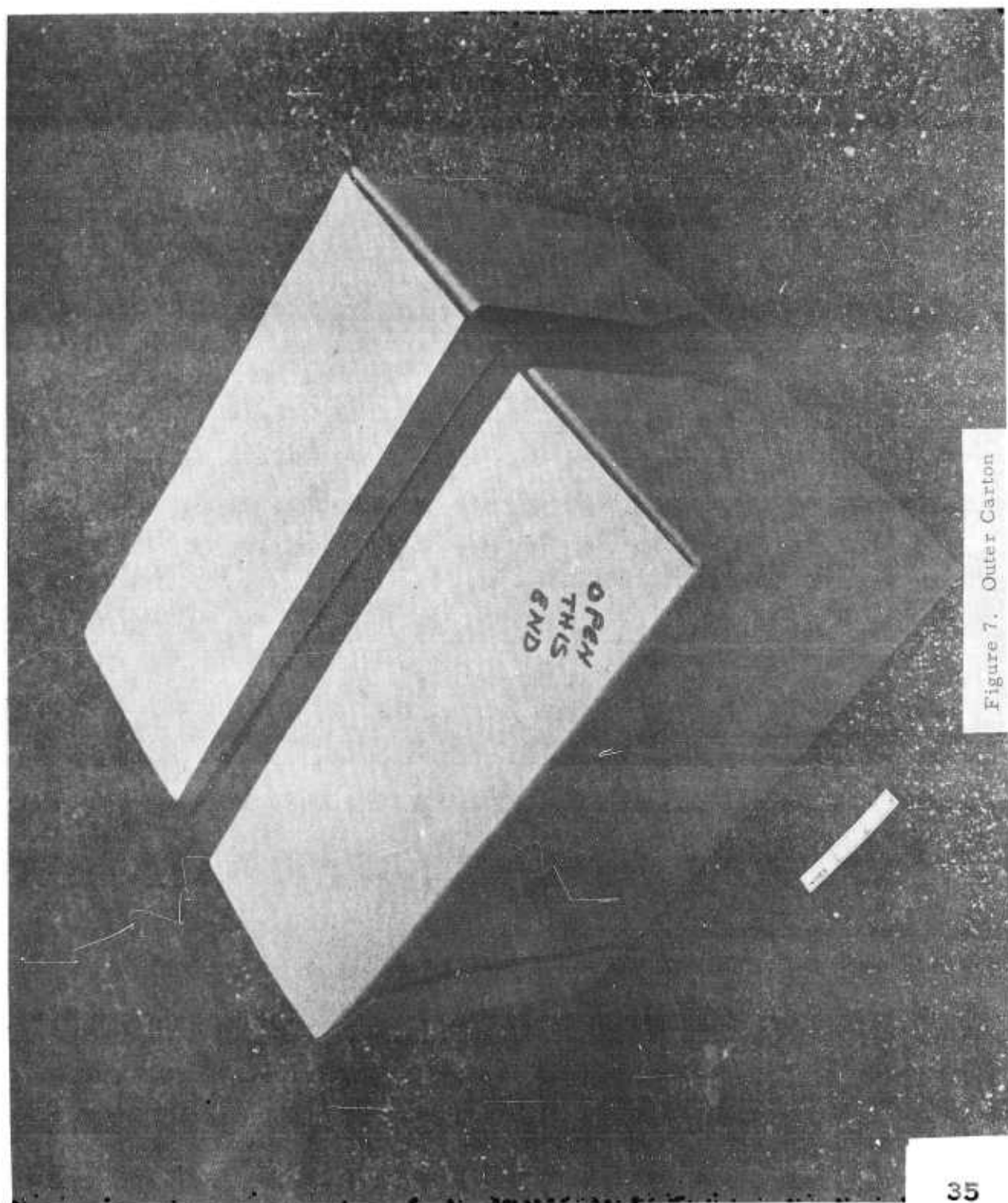
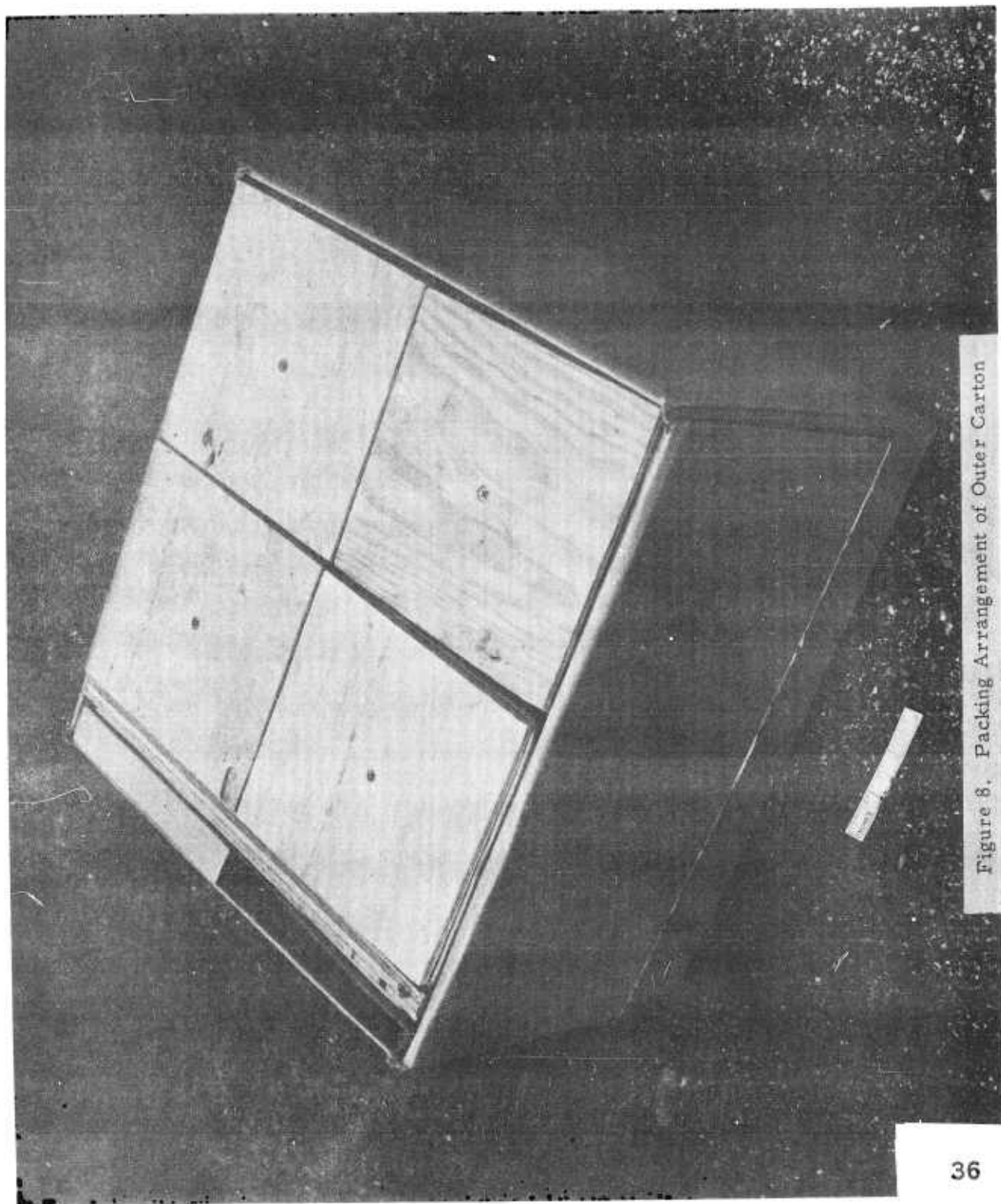


Figure 7. Outer Carton



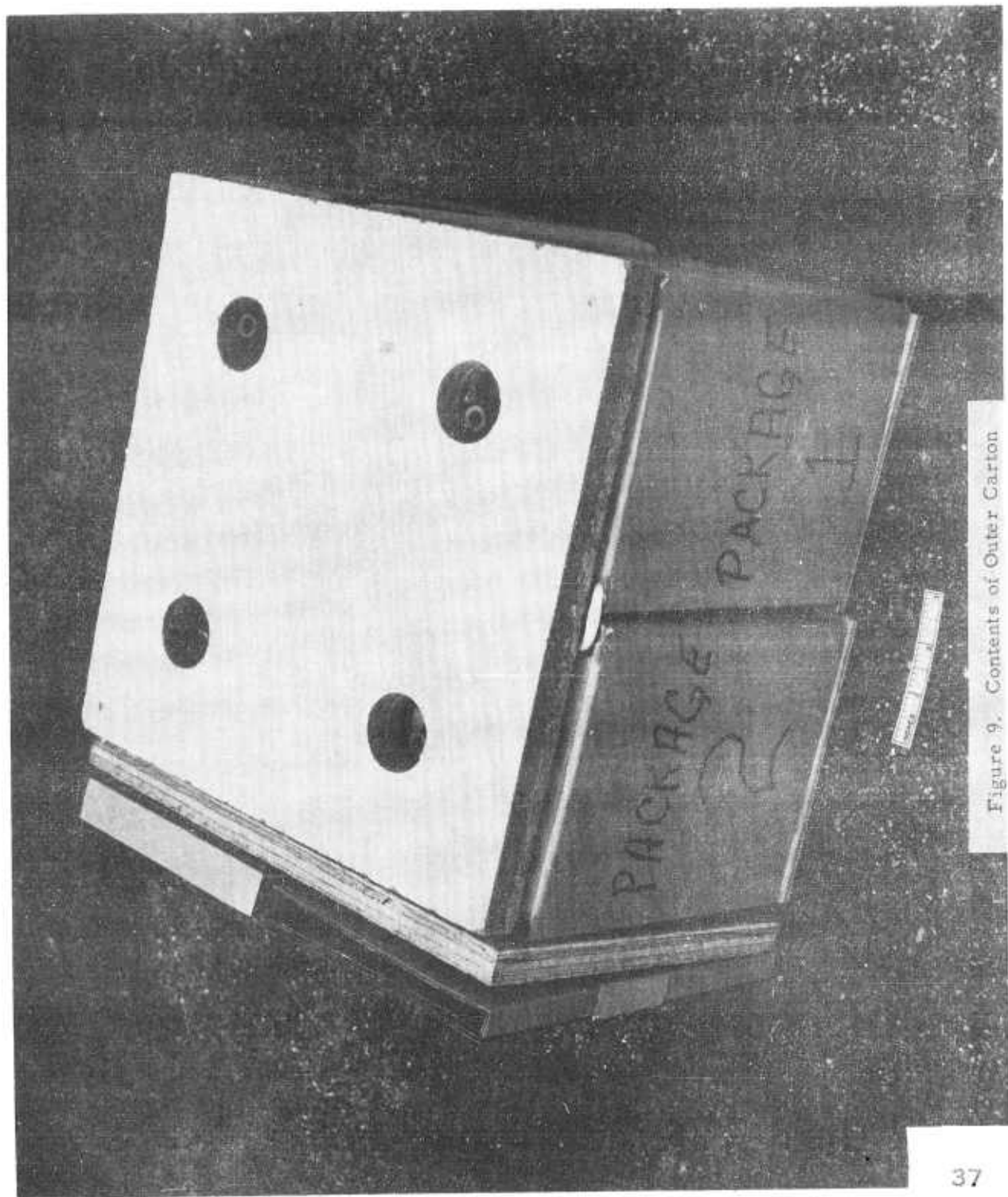


Figure 9. Contents of Outer Carton



Figure 10. Inner Packages 1 Thru 5

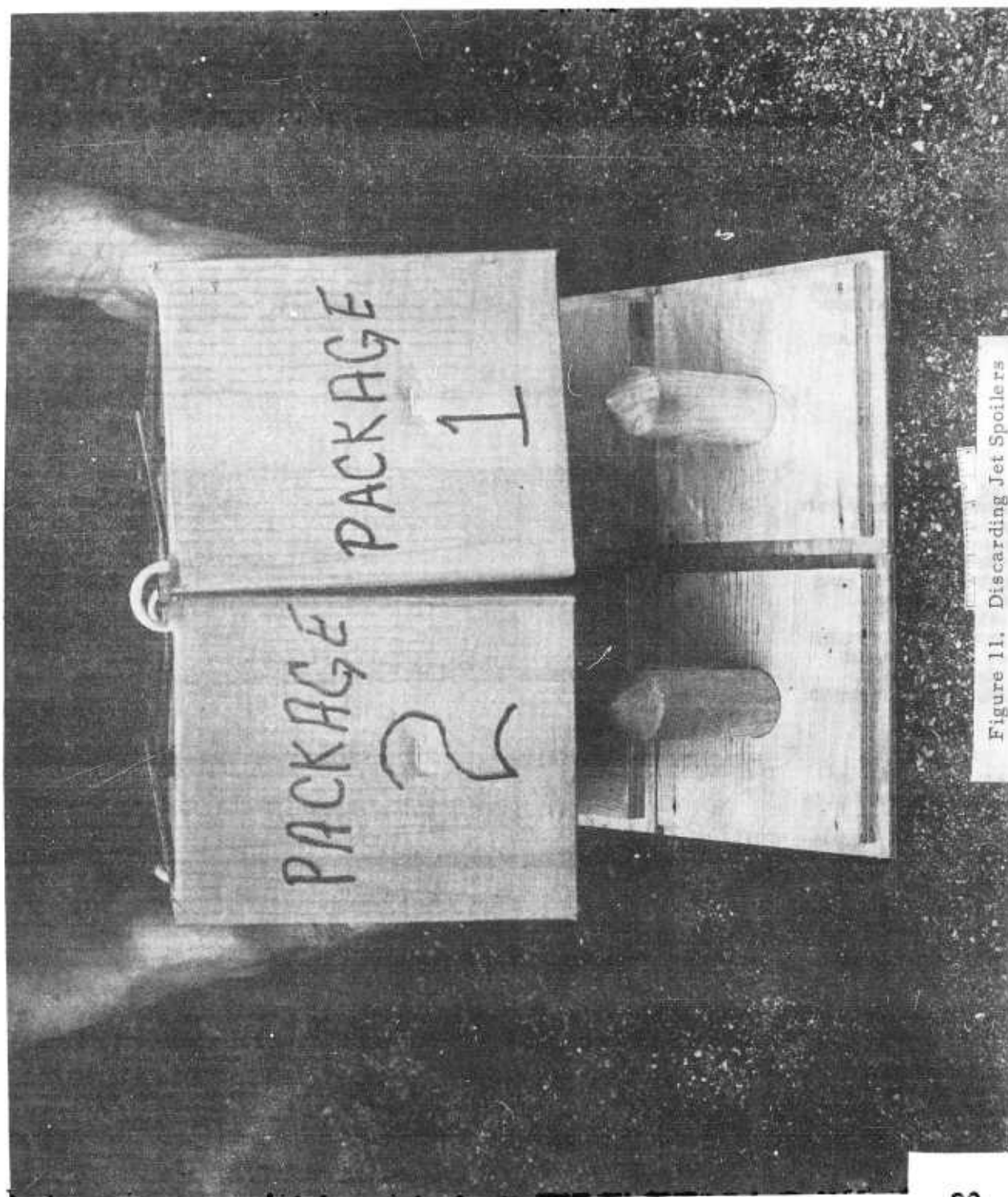
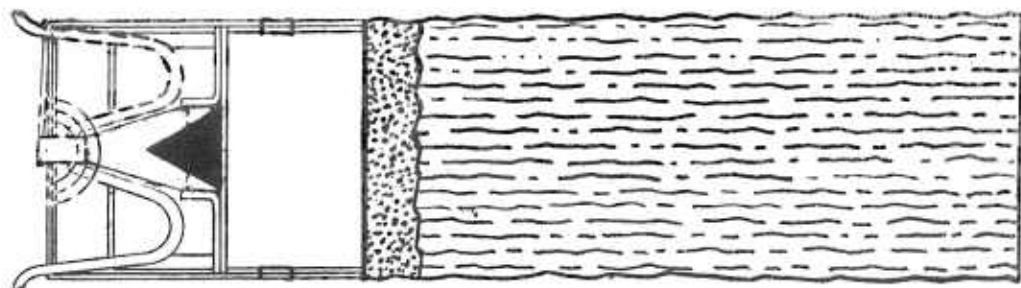
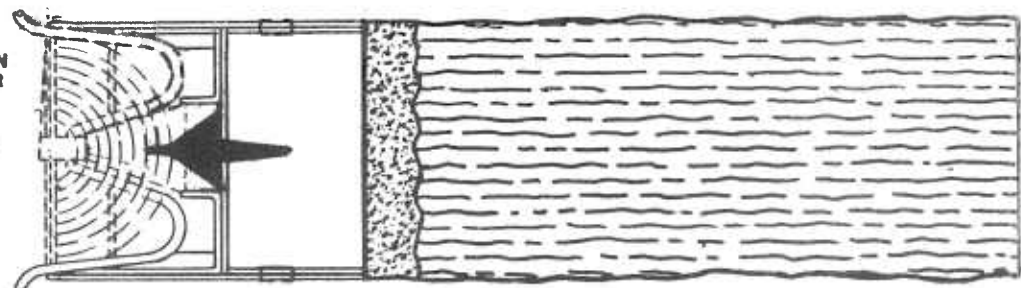


Figure 11. Discarding Jet Spoilers

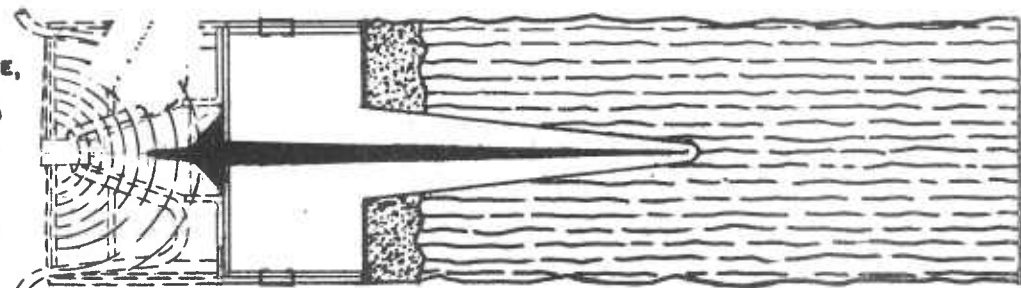
ENLARGED VIEW OF
CHARGE DEMOLITION
MIO6 AT INSTANT OF
DETONATION.



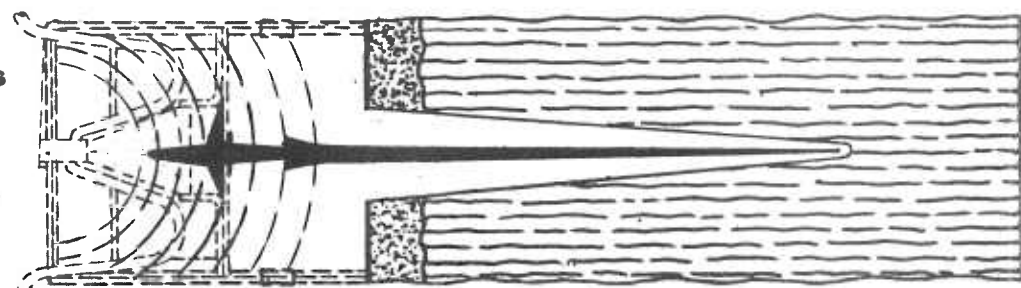
HIGH PRESSURE
DEVELOPED BY EXPLOSION
CAUSES CONICAL COPPER
LINER TO COLLAPSE
PROGRESSIVELY FROM
APEX TO BASE. PLASTIC
CASE, INSULATING BODY
AND PACKING ARE
PULVERIZED BY BLAST.



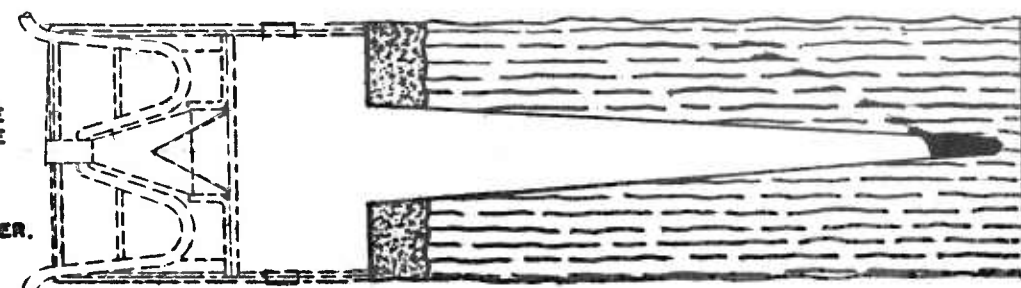
LIKE TOOTHPASTE
SQUEEZED FROM A TUBE,
A JET OF COPPER
PARTICLES IS SQUEEZED
FROM THE INNER
SURFACE OF THE CONE
AS IT COLLAPSES.
VELOCITY OF THE
INDIVIDUAL PARTICLES
OF THE JET RANGE
FROM 10,000 TO
30,000 FT. PER SECOND.



AS THE ENERGY OF
INDIVIDUAL PARTICLES
IS DISSIPATED IN
PENETRATING PERMA-
FROST, SUCCEEDING
PARTICLES CONTINUE
TO PENETRATE TARGET
UNTIL THE MATERIAL
OF THE JET IS
EXHAUSTED.



IN A MATTER OF
MICROSECONDS, THE
PROCESS IS COMPLETE
AND A HOLE IS MADE
SUITABLE FOR THE
HAND DRIVING OF
STAKES FOR THE
LITTLE JOHN LAUNCHER.



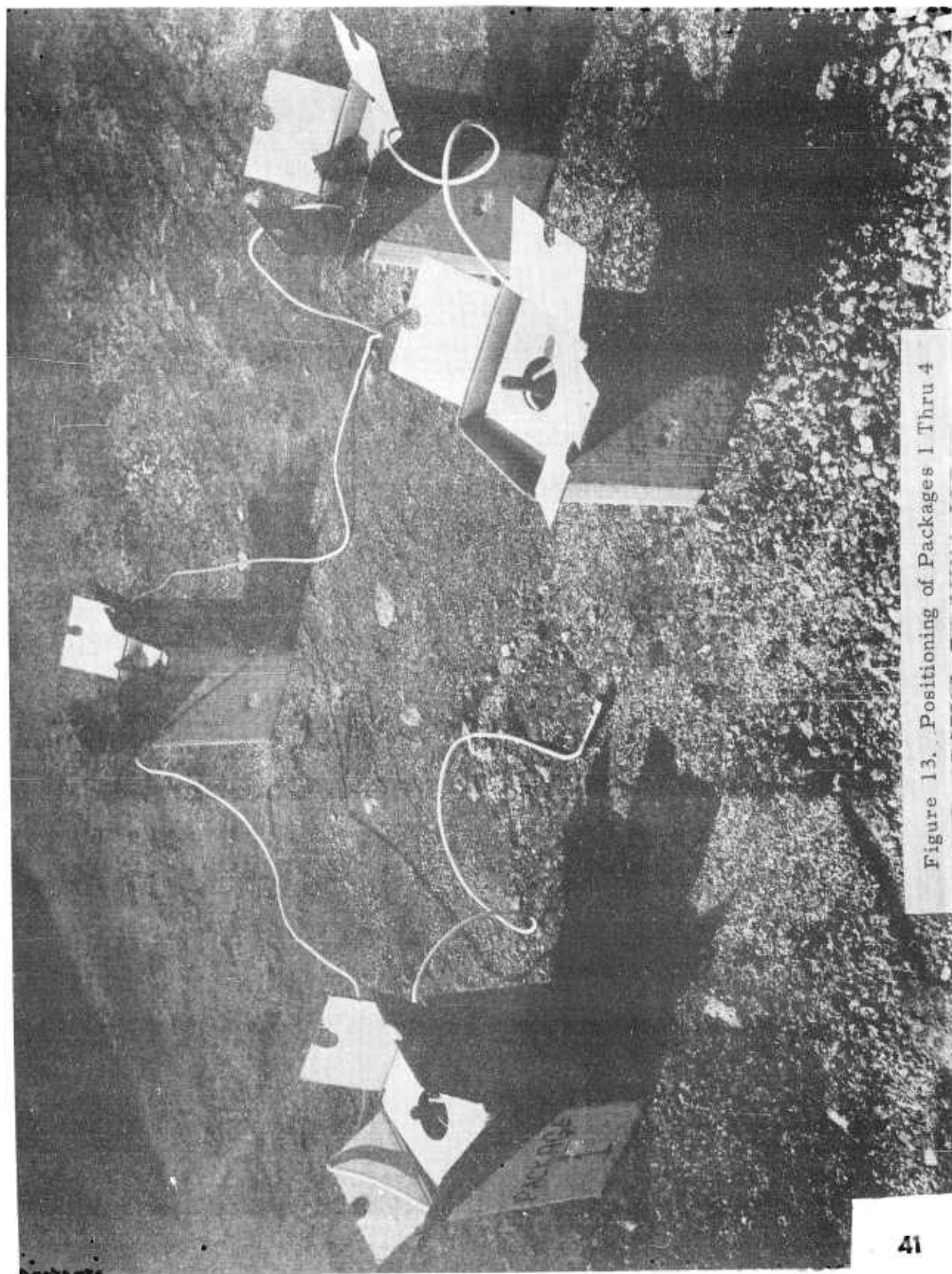


Figure 13. Positioning of Packages 1 Thru 4

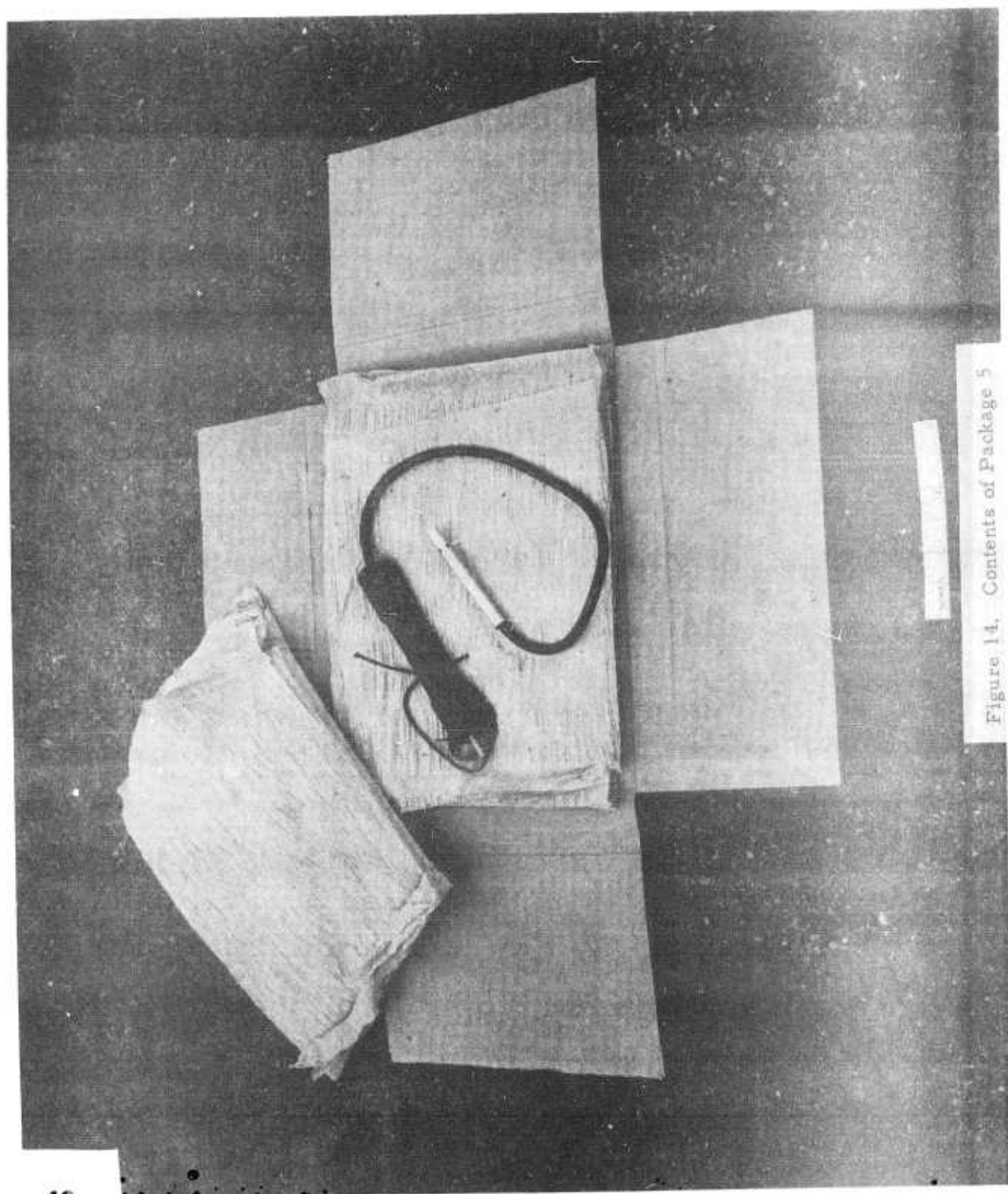


Figure 14. Contents of Package 5

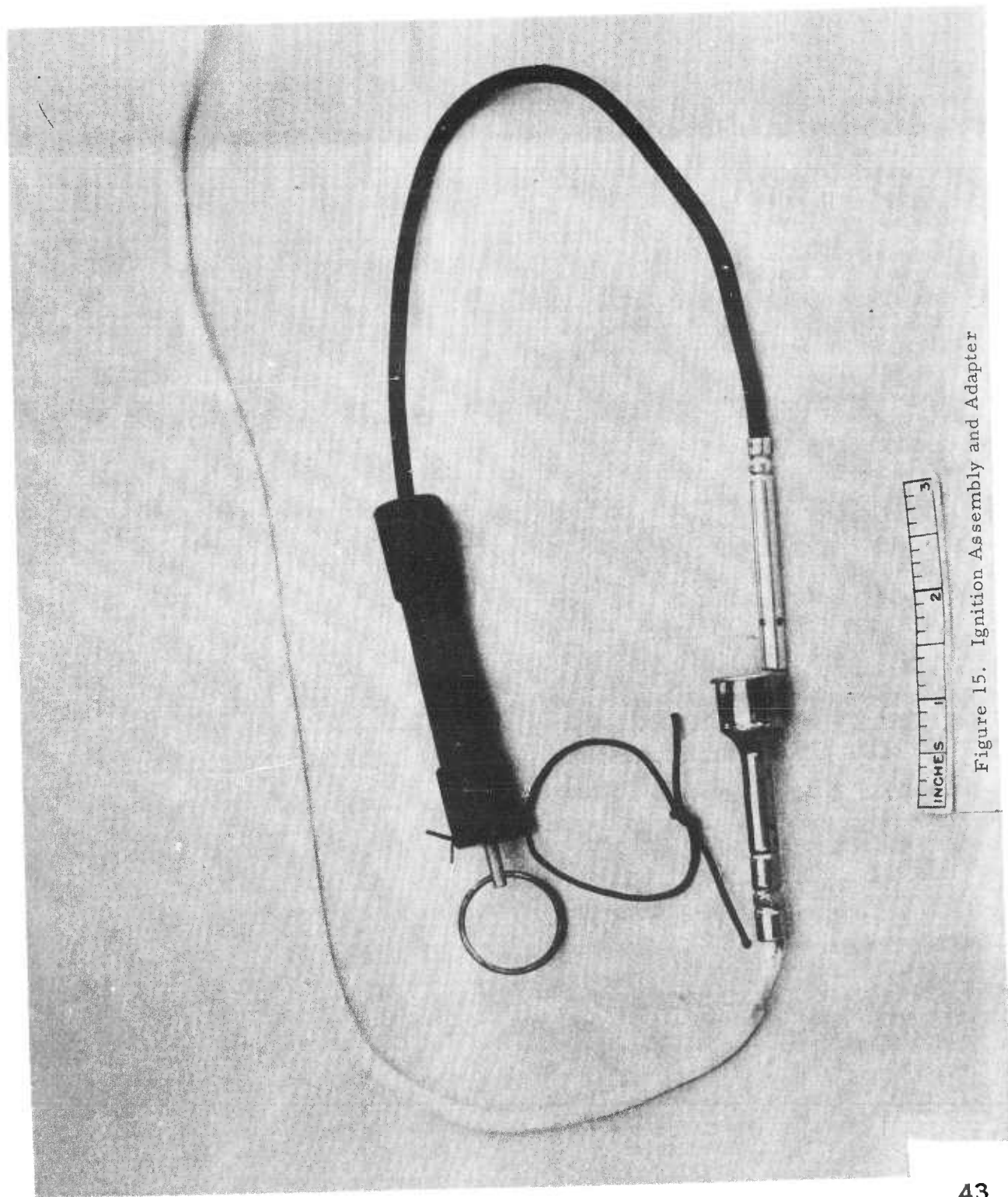


Figure 15. Ignition Assembly and Adapter

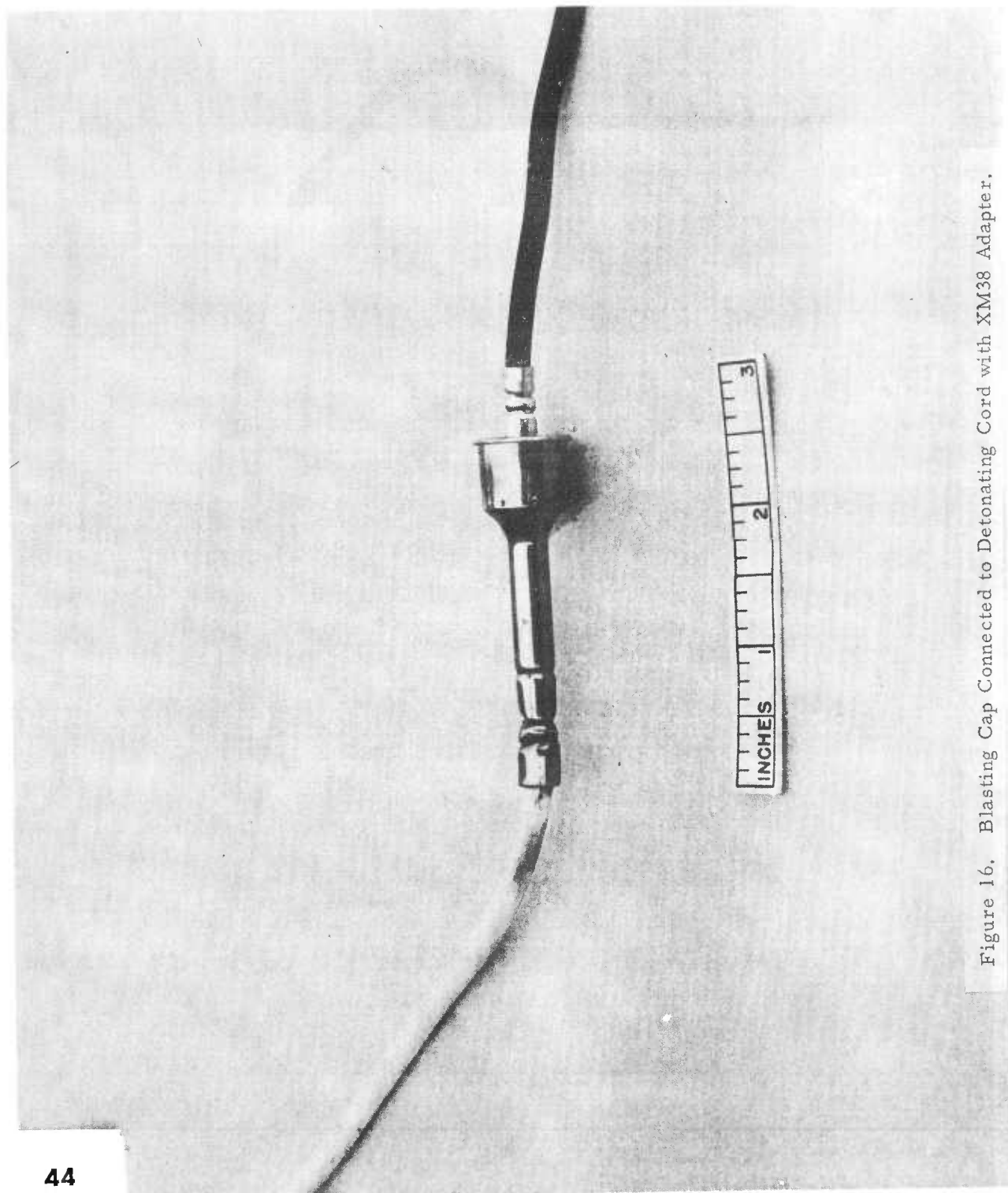


Figure 16. Blasting Cap Connected to Detonating Cord with XM38 Adapter.

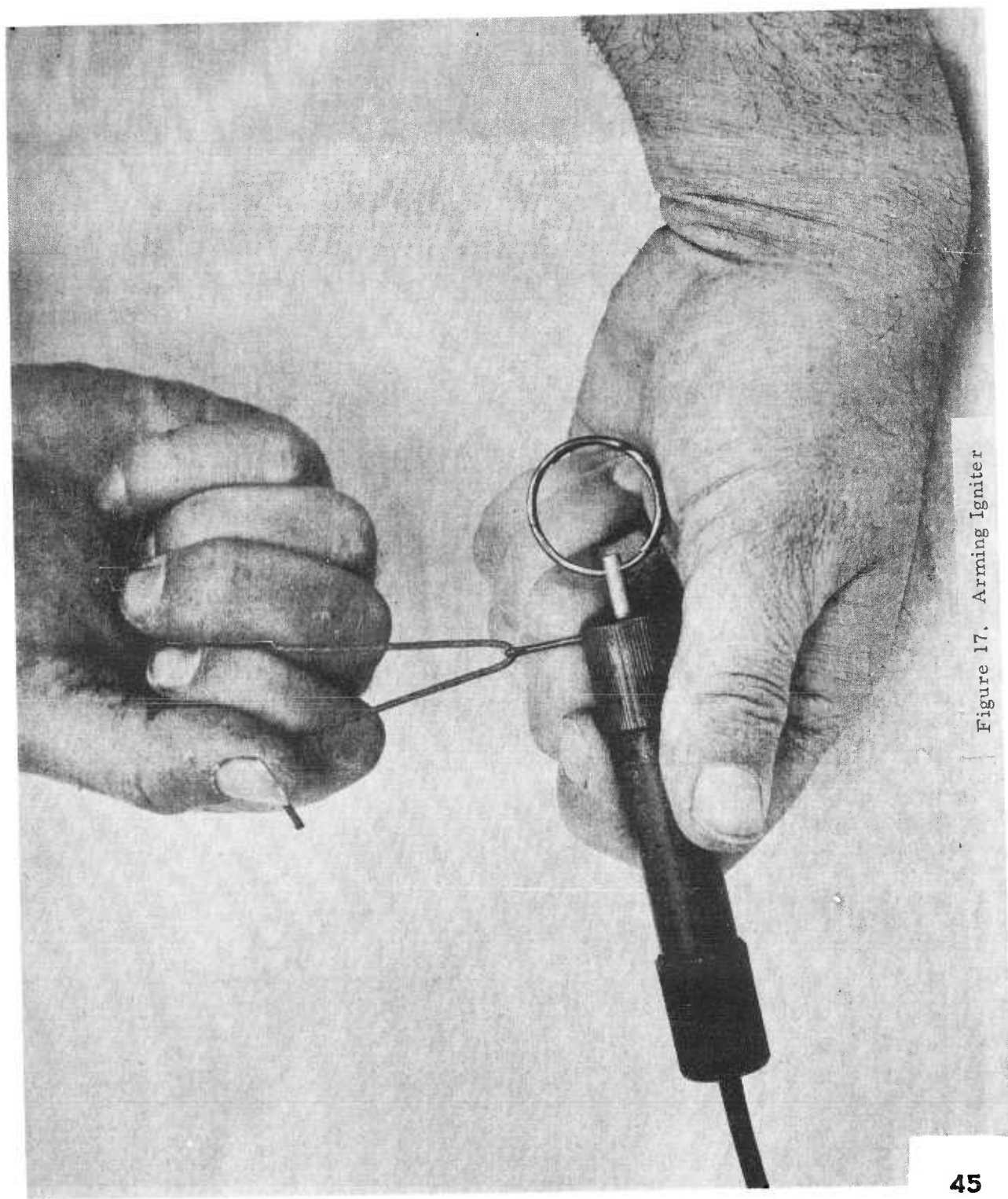


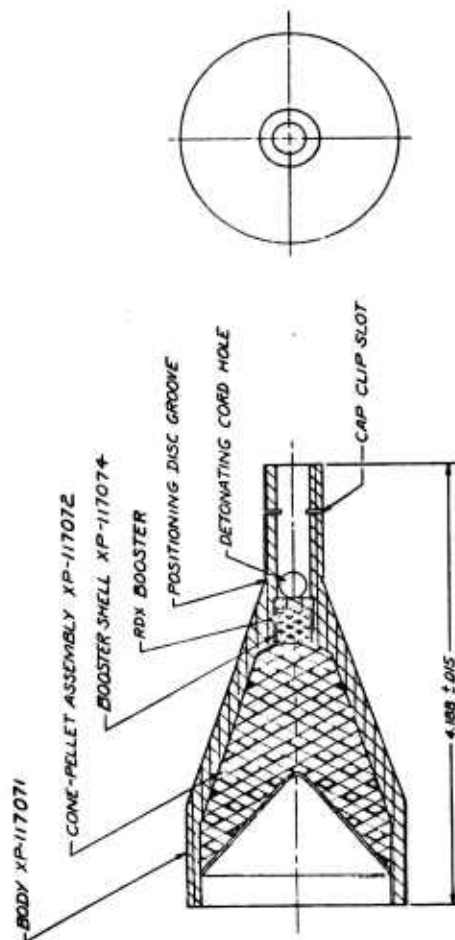
Figure 17. Arming Igniter



Figure 18. Firing Igniter

DXP-117070

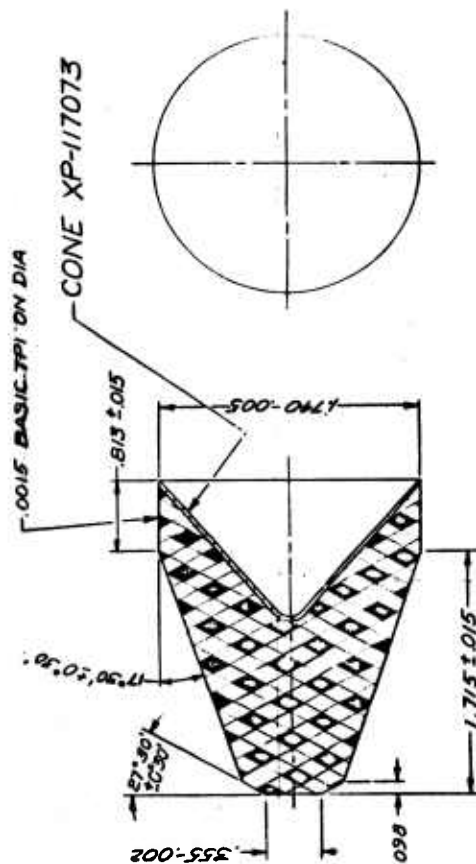
8. 3/11/70



- NOTES:
- 1- SPEC MIL-A-2550 APPLIES.
 - 2- CONE-PELLET SEATED IN BODY AT 20 PSI GAGE PRESSURE ON SEATING PRESS. BOOSTER CONTAINS APPROX 12 GRAINS PLAIN RDX (LOADED FLUSH $\pm 1/32$ IN. BELOW TOP OF SHELL) TYPE 2, MIL-R-00398B.
 - 3- CONE-PELLET GLUED IN BODY WITH COMPLETE RING EDGE OF CONE $9/32$ IN. $\pm 1/32$ IN. FROM END OF BODY USING CEMENT MIXTURE (SEE NOTE 4).
 - 4- CEMENT MIXTURE: DUPONT CEMENT #4678 (SEE NOTE 5) 100 PARTS AND CAT # I-22 WHITE CALCINED INFUSORIAL EARTH POWDER (SEE NOTE 6) 15 ± 5 PARTS.
 - 5- APPROVED SOURCE: E. I. DUPONT DE NEMOURS & CO. INC., WILMINGTON, DEL.
 - 6- APPROVED SOURCE: FISHER SCIENTIFIC CO. 633 GREENWICH ST, NEW YORK 24, N.Y.
 - 7- ALL SOURCES MUST SUPPLY AN ITEM EQUIVALENT TO THE MANUFACTURER'S ITEM INDICATED. ORDNANCE CORPS APPROVAL REQUIRED.

Figure 19

PICATINNY Arsenal ORDNANCE CORPS SHOP OF THE ARMY DOVER, NEW JERSEY		CHARGE DEMOLITION SHAPED XM-106		DRAWING NO. XP-117070	
DATE 3/11		BY 11		SHEET 1	



1-SPEC MIL-A-2550 APPLIES.

2 - CHARGE WEIGHT IS 72-75 GRAMS GRAPHITED 95/5 RDX/WAX

2-CHARGE WEIGHT IS 72-75 GRAMS GRAMMED 75 NEW/HR.

3-EXPLOSIVE MIXTURE, 1/3 NITROFORM, ALL OTHERS HAZARDOUS
RDX TYPE B ----- 95% ± 1% SPEC MIL-R-00398B

WAX --- 5% \pm 1% SPEC MIL-W-0020553A (ORD)

GRAPHITE, GRADE 2-----1% MAX ADDED SPEC JAN-G-155

CONCERN SET DIAMETER TO BE ADJUSTED TO GIVE A SLIDING FIT IN BODY AS BODY

4 - CONE-PELLET

I.D. CHANGES.
PERCENTAGE OF CAME BELLET ASSEMBLY MUST NOT EXCEED 0.015 MEASURED

5- ECCENTRICITY OF CONE-PELLET ASSEMBLY MUST NOT EXCEED 0.015 MEASURED AT THE CENTER OF THE STRAIGHT WALL SECTION. CONE-PELLET ASSEMBLY

AT THE CENTER OF THE STRAIGHT WALL SECTION. CONE-PELLET ASSAY MUST BE FREE OF CRACKS AND CONE MUST ADHERE TO PELLET.

Figure 21

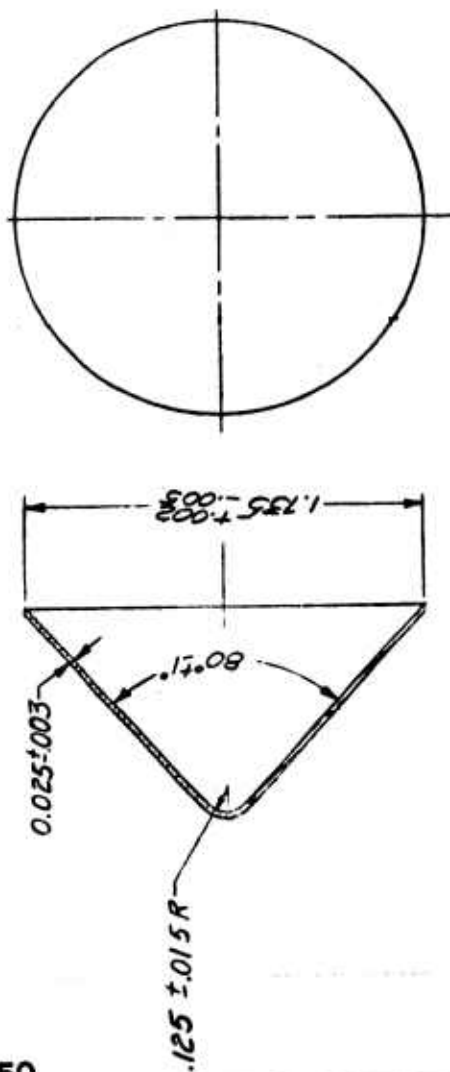
[illegible]

BXP-117073

THIS DRAWING IS THE PROPERTY OF THE ARMY. IT IS TO BE KEPT IN THE OFFICE OF THE DRAWING ENGINEER. IT IS TO BE RETURNED TO THE OFFICE OF THE DRAWING ENGINEER WHEN THE DRAWING IS NO LONGER NEEDED. IT IS TO BE KEPT IN THE OFFICE OF THE DRAWING ENGINEER FOR A PERIOD OF 10 YEARS AFTER THE DATE OF THE LAST REVISION. IT IS TO BE KEPT IN THE OFFICE OF THE DRAWING ENGINEER FOR A PERIOD OF 10 YEARS AFTER THE DATE OF THE LAST REVISION. IT IS TO BE KEPT IN THE OFFICE OF THE DRAWING ENGINEER FOR A PERIOD OF 10 YEARS AFTER THE DATE OF THE LAST REVISION.

REV	DESCRIPTION	DATE	APPROVAL

50



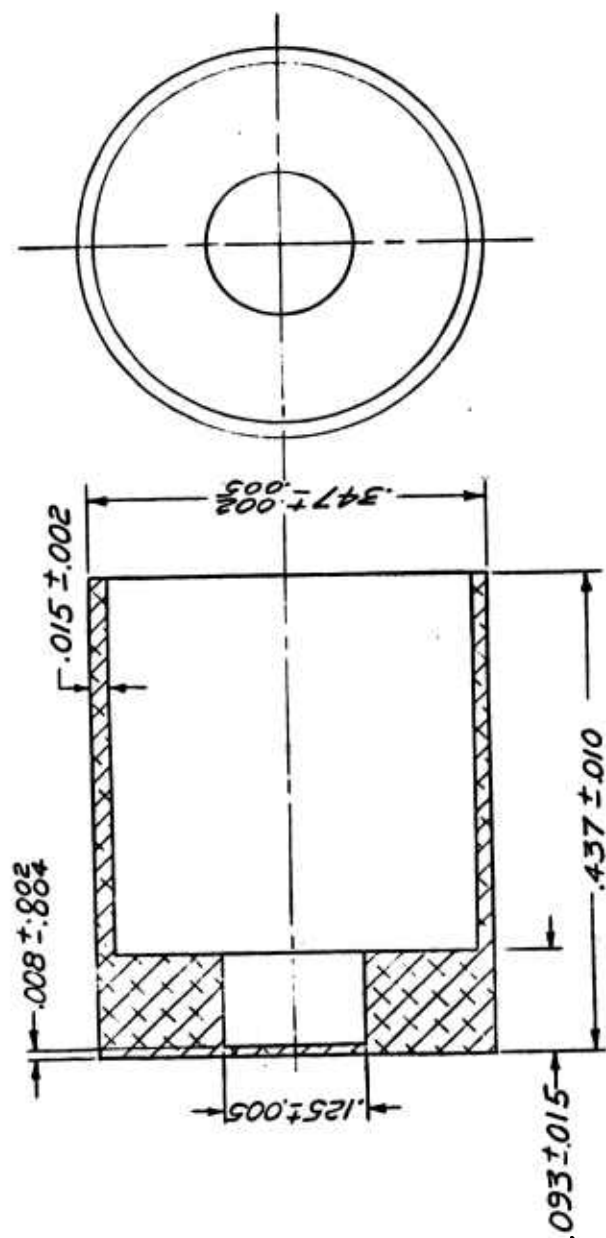
- NOTES:
- 1- SPEC MIL-A-2550 APPLIES
 - 2- MATERIAL: ELECTROLYTIC COPPER, SPEC QQ-C-576, TOUGH PITCH

Figure 22

ORDNANCE CORPS DEPT OF THE ARMY DOVER, N. J.		BXP-117073	
CONE		SCALE 2/1	UNIT WT
ORIGINAL DATE OF DRAWING JAN 11 1962		ORD CORPS	
DRAWN BY SE	CHECKER	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
TRACED	CHECKER	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
ENGINEER	CHECKER	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
SUBMITTED		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
MATERIAL NOTE 2		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
HEAT TREATMENT		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
FINAL PROTECTIVE FINISH		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
PHYSICAL PROPERTIES		APPLY PART NO AS SPECIFIED	
YP	TS	APPLY PART NO AS SPECIFIED	
EL 2	RA	APPLY PART NO AS SPECIFIED	
BH	RM	APPLY PART NO AS SPECIFIED	
NEXT ASSY USED ON		APPLY PART NO AS SPECIFIED	
APPLICATION		APPLY PART NO AS SPECIFIED	
DO NOT DO		APPLY PART NO AS SPECIFIED	

00 Aug 1961
1 04 54

REVISIONS		
SYM	DESCRIPTION	DATE APPROVAL

[illegible]

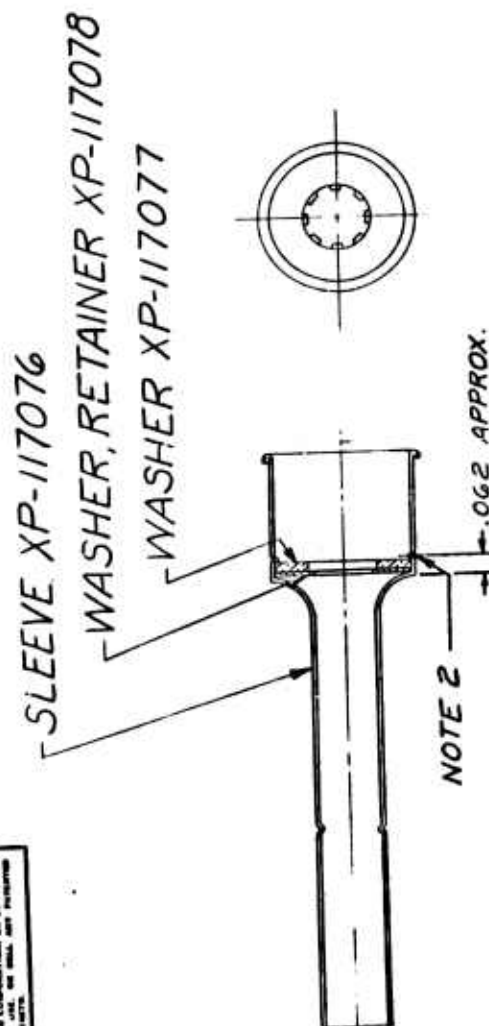
NOTES:

1- SPEC MIL-A-2550 APPLIES.

2-MATERIAL: ALUMINUM1 ALLOY, SHEET, TEMPER 0, SPEC. QQ-A-318 OR QQ-A-359.

[illegible]

REVISIONS			DATE	APPROVAL
SYM	DESCRIPTION			



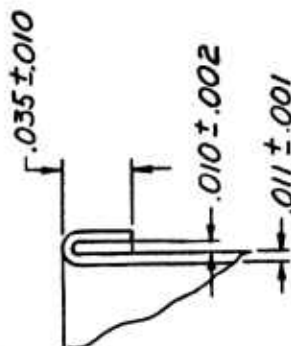
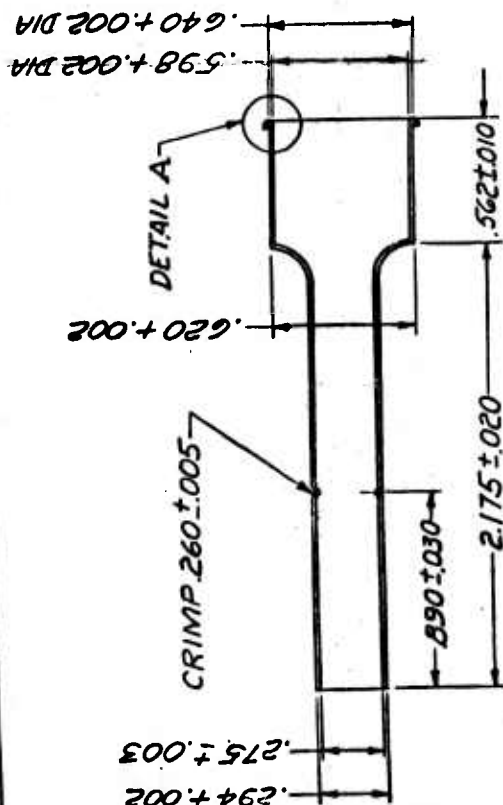
NOTES
1 - SPEC MIL-A-2550 APPLIES.
2 - 8 STAKE CRIMPS AT 45° SPACINGS - DEPTH
OF .010" TO .012". CRIMPS SHOULD SECURE
WASHER AND RETAINER FIRMLY IN PLACE.

Figure 24

[illegible]

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



DETAIL A (SCALE 10%)

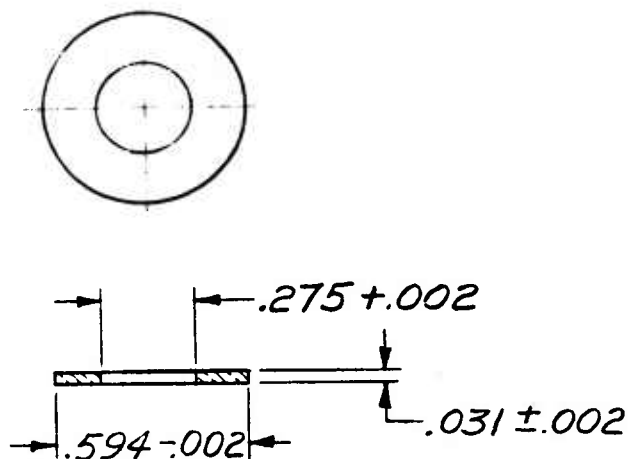
NOTES:

- 1 - SPEC MIL-A-2550 APPLIES.
2 - MATERIAL: GILDING METAL (90/10 BRASS) DRAWING. ANNEAL, SPEC JAN-G-383

Figure 25

[illegible]

PHYSICAL PROPERTIES		APPLICATION		A XP-117077			
YP		NEXT ASSY	USED ON				
TS		EXP-117075					
EL2				SYM	DESCRIPTION	DATE	APPROVAL
RA							
BH							
RH							
		DO NOT	APPLY PART NO.				
		DO	AS SPECIFIED				



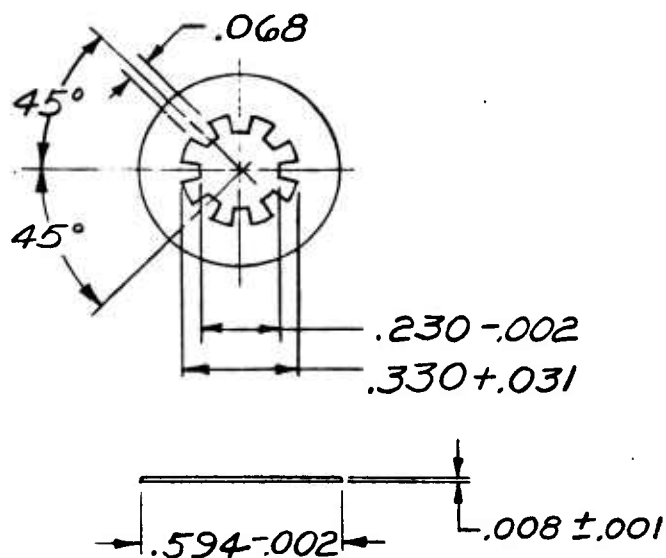
NOTES:

- 1-SPEC MIL-A-2550 APPLIES
- 2-MATERIAL: GILDING METAL (90/10 BRASS), COLD ROLLED, SPEC JAN-G-383.

Figure 26

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DECIMALS FRACTIONS ANGLES	ORIGINAL DATE OF DRAWING FEB 12, 1962	WASHER	PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY DOVER, NEW JERSEY	
	DRAFTSMAN JB			CHECKER
	TRACER			CHECKER
	ENGR JT			ENGR
MATERIAL SEE NOTE 2	SUBMITTED [Signature] ORD CORPS	SCALE 2/1	UNIT WT	
HEAT TREATMENT	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE			
FINAL PROTECTIVE FINISH	ORD CORPS			
		DWG SIZE A	XP-117077	
		SHEET	OF	

PHYSICAL PROPERTIES		APPLICATION		AXP-117078			
YP		NEXT ASSY	USED ON	REVISIONS			
TS		BXP-117075		SYM	DESCRIPTION	DATE	APPROVAL
EL2							
RA							
BH							
RH							
		DO NOT	APPLY PART NO.				
		DO	AS SPECIFIED				



NOTES:

- 1 - SPEC MIL-A-2550 APPLIES
- 2 - MATERIAL: BRASS SPEC QQ-B-613a TEMPER SPRING COMPOSITION

Figure 27

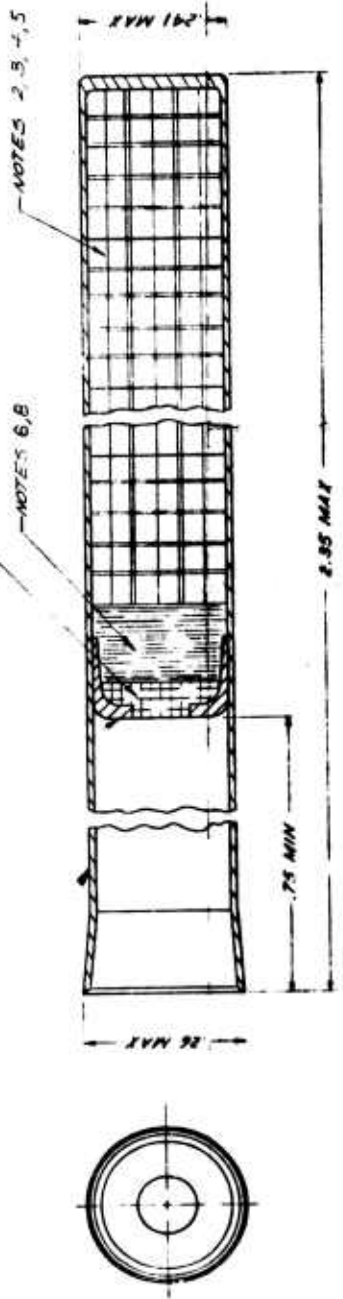
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON:	ORIGINAL DATE OF DRAWING FEB 12, 1962		WASHER, RETAINER	PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY FOVER, NEW JERSEY
	DRAFTSMAN JS	CHECKER		
	TRACER	CHECKER		
	ENGR	ENGR		
DECIMALS	SUBMITTED		SCALE 2/1	UNIT WT
FRACTIONS	ORD CORPS			
ANGLES	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE			
MATERIAL	ORD CORPS			
HEAT TREATMENT			DWG SIZE A	XP-117078
FINAL PROTECTIVE FINISH			SHEET	OF

REV	DESCRIPTION	DATE	APPROVAL
A	EOPA-4682	9/30/40	PL

1- SPEC MIL-G-2850 APPLIES
2- CHARGE, BASE 14.5-20 GR. (943-130 MG) RDX, TYPE A OR B, CLASS C, SPEC MIL-R-398.
3- ALTERNATIVE GRANULATION OF RDX MAY BE AS FOLLOWS THROUGH U.S. STANDARD SIEVES, SPEC RR-5-366 :-
SIEVE NO.
16
20
40
% PASSING
100 %
15 % MAX
5 % MAX

56

-CLIP-8830949 -FERRULE-8830950 -NOTES 7,8
NOTE 8



NOTES:-

- 1- SPEC MIL-G-2850 APPLIES
- 2- CHARGE, BASE 14.5-20 GR. (943-130 MG) RDX, TYPE A OR B, CLASS C, SPEC MIL-R-398.
- 3- ALTERNATIVE GRANULATION OF RDX MAY BE AS FOLLOWS THROUGH U.S. STANDARD SIEVES, SPEC RR-5-366 :-
- 4- BASE CHARGE (RDX) IS PRESSED INTO THE CUP IN FOUR (4) INCREMENTS AT A PRESSURE BETWEEN 5000 AND 6000 PSI.
- 5- RDX MAY BE IN PELLET FORM; PELLETS TO BE MANUFACTURED IN ACCORDANCE WITH SPEC RFX-PD-650, TYPE I OR II. RDX MAY BE TREATED WITH AN AMINE SALT OF SATURATED LONG CHAIN ALCOHOL SULPHATE (LUPONOL G) AND GRAPHITE TO IMPROVE PROCESSING.
- 6- CHARGE INTERMEDIATE 1- 3.7 GR. (240 MG) ADVISORY 1- 3.5 GR. (208 MG) MIN., LEAD AZIDE, TYPE I, SPEC RFX-PD-4817, LEAD AZIDE MAY BE TREATED WITH 1/2 % CALCIUM STEARATE, JAN-C-243.
- 7- CHARGE, IGNITION 1- 35 GR. (226 MG) ADVISORY 1- 35 GR. (226 MG) MIN, NORMAL LEAD STEPHENATE, SPEC RFX-PD-650 MAY BE TREATED WITH 1/2 % GRAPHITE AND 1/2 % CALCIUM STEARATE, SPEC JAN-C-243, TO IMPROVE PROCESSING.
- 8- ASSEMBLE CHARGES AND FERRULE IN ORDER SHOWN, THEN CONSOLIDATE AT A PRESSURE BETWEEN 5000 AND 6000 PSI.

FOR LIST OF PARTS, SEE
ENGINEERING PARTS LIST E-3094

Figure 28



ORDNANCE IN-T NO. 8830948

CAP, BLASTING,
NON-ELECTRIC,
M7 ASSEMBLY

SCALE 1/4" = 1"

DATE 1/1/41

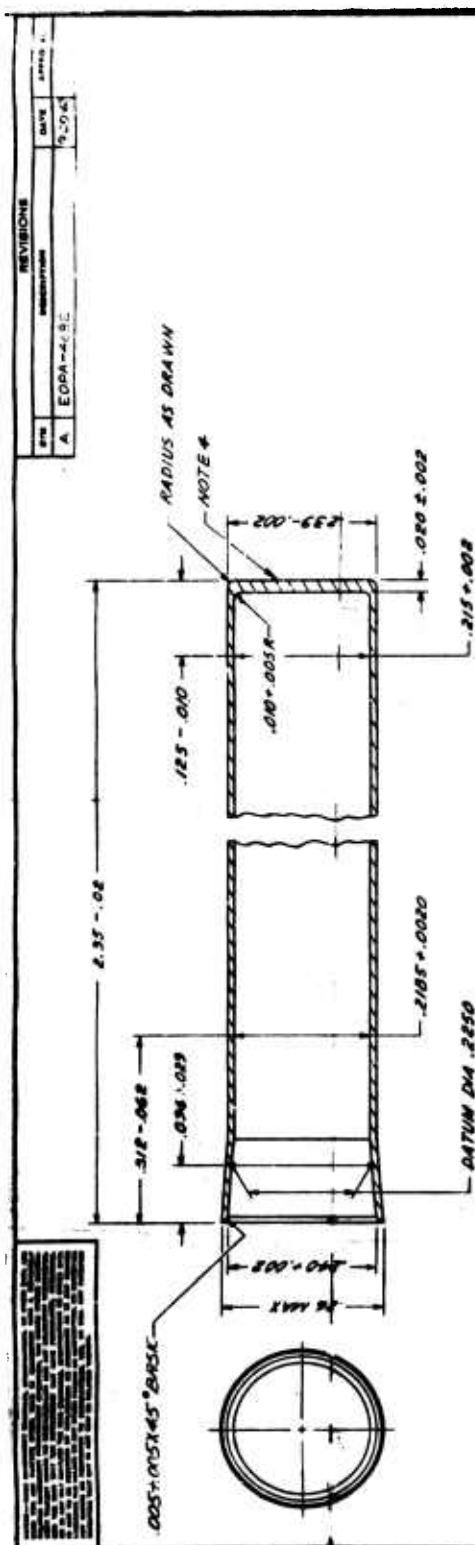
8830948

ORDNANCE CORPS
DEPT OF THE ARMY
DOVER, NEW JERSEY

C

ITEM NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	CLIP-8830949	1	EA	
2	FERRULE-8830950	1	EA	
3	BASE CHARGE (RDX)	1	EA	
4	CHARGE INTERMEDIATE 1	1	EA	
5	CHARGE INTERMEDIATE 2	1	EA	
6	CHARGE INTERMEDIATE 3	1	EA	
7	CHARGE INTERMEDIATE 4	1	EA	
8	CHARGE INTERMEDIATE 5	1	EA	
9	CHARGE INTERMEDIATE 6	1	EA	
10	CHARGE INTERMEDIATE 7	1	EA	
11	CHARGE INTERMEDIATE 8	1	EA	
12	CHARGE INTERMEDIATE 9	1	EA	
13	CHARGE INTERMEDIATE 10	1	EA	
14	CHARGE INTERMEDIATE 11	1	EA	
15	CHARGE INTERMEDIATE 12	1	EA	
16	CHARGE INTERMEDIATE 13	1	EA	
17	CHARGE INTERMEDIATE 14	1	EA	
18	CHARGE INTERMEDIATE 15	1	EA	
19	CHARGE INTERMEDIATE 16	1	EA	
20	CHARGE INTERMEDIATE 17	1	EA	
21	CHARGE INTERMEDIATE 18	1	EA	
22	CHARGE INTERMEDIATE 19	1	EA	
23	CHARGE INTERMEDIATE 20	1	EA	
24	CHARGE INTERMEDIATE 21	1	EA	
25	CHARGE INTERMEDIATE 22	1	EA	
26	CHARGE INTERMEDIATE 23	1	EA	
27	CHARGE INTERMEDIATE 24	1	EA	
28	CHARGE INTERMEDIATE 25	1	EA	
29	CHARGE INTERMEDIATE 26	1	EA	
30	CHARGE INTERMEDIATE 27	1	EA	
31	CHARGE INTERMEDIATE 28	1	EA	
32	CHARGE INTERMEDIATE 29	1	EA	
33	CHARGE INTERMEDIATE 30	1	EA	
34	CHARGE INTERMEDIATE 31	1	EA	
35	CHARGE INTERMEDIATE 32	1	EA	
36	CHARGE INTERMEDIATE 33	1	EA	
37	CHARGE INTERMEDIATE 34	1	EA	
38	CHARGE INTERMEDIATE 35	1	EA	
39	CHARGE INTERMEDIATE 36	1	EA	
40	CHARGE INTERMEDIATE 37	1	EA	
41	CHARGE INTERMEDIATE 38	1	EA	
42	CHARGE INTERMEDIATE 39	1	EA	
43	CHARGE INTERMEDIATE 40	1	EA	
44	CHARGE INTERMEDIATE 41	1	EA	
45	CHARGE INTERMEDIATE 42	1	EA	
46	CHARGE INTERMEDIATE 43	1	EA	
47	CHARGE INTERMEDIATE 44	1	EA	
48	CHARGE INTERMEDIATE 45	1	EA	
49	CHARGE INTERMEDIATE 46	1	EA	
50	CHARGE INTERMEDIATE 47	1	EA	
51	CHARGE INTERMEDIATE 48	1	EA	
52	CHARGE INTERMEDIATE 49	1	EA	
53	CHARGE INTERMEDIATE 50	1	EA	
54	CHARGE INTERMEDIATE 51	1	EA	
55	CHARGE INTERMEDIATE 52	1	EA	
56	CHARGE INTERMEDIATE 53	1	EA	
57	CHARGE INTERMEDIATE 54	1	EA	
58	CHARGE INTERMEDIATE 55	1	EA	
59	CHARGE INTERMEDIATE 56	1	EA	
60	CHARGE INTERMEDIATE 57	1	EA	
61	CHARGE INTERMEDIATE 58	1	EA	
62	CHARGE INTERMEDIATE 59	1	EA	
63	CHARGE INTERMEDIATE 60	1	EA	
64	CHARGE INTERMEDIATE 61	1	EA	
65	CHARGE INTERMEDIATE 62	1	EA	
66	CHARGE INTERMEDIATE 63	1	EA	
67	CHARGE INTERMEDIATE 64	1	EA	
68	CHARGE INTERMEDIATE 65	1	EA	
69	CHARGE INTERMEDIATE 66	1	EA	
70	CHARGE INTERMEDIATE 67	1	EA	
71	CHARGE INTERMEDIATE 68	1	EA	
72	CHARGE INTERMEDIATE 69	1	EA	
73	CHARGE INTERMEDIATE 70	1	EA	
74	CHARGE INTERMEDIATE 71	1	EA	
75	CHARGE INTERMEDIATE 72	1	EA	
76	CHARGE INTERMEDIATE 73	1	EA	
77	CHARGE INTERMEDIATE 74	1	EA	
78	CHARGE INTERMEDIATE 75	1	EA	
79	CHARGE INTERMEDIATE 76	1	EA	
80	CHARGE INTERMEDIATE 77	1	EA	
81	CHARGE INTERMEDIATE 78	1	EA	
82	CHARGE INTERMEDIATE 79	1	EA	
83	CHARGE INTERMEDIATE 80	1	EA	
84	CHARGE INTERMEDIATE 81	1	EA	
85	CHARGE INTERMEDIATE 82	1	EA	
86	CHARGE INTERMEDIATE 83	1	EA	
87	CHARGE INTERMEDIATE 84	1	EA	
88	CHARGE INTERMEDIATE 85	1	EA	
89	CHARGE INTERMEDIATE 86	1	EA	
90	CHARGE INTERMEDIATE 87	1	EA	
91	CHARGE INTERMEDIATE 88	1	EA	
92	CHARGE INTERMEDIATE 89	1	EA	
93	CHARGE INTERMEDIATE 90	1	EA	
94	CHARGE INTERMEDIATE 91	1	EA	
95	CHARGE INTERMEDIATE 92	1	EA	
96	CHARGE INTERMEDIATE 93	1	EA	
97	CHARGE INTERMEDIATE 94	1	EA	
98	CHARGE INTERMEDIATE 95	1	EA	
99	CHARGE INTERMEDIATE 96	1	EA	
100	CHARGE INTERMEDIATE 97	1	EA	

1-883971



NOTES:
 1- SPEC MIL-G-2550, MIL-STD-8, DWG 304-7.
 AND MIL-STD-10 APPLY.
 2- MATERIAL: - ALUMINUM, ALLOY,
 SHEET, TEMPER Q SPEC 90-9-318.
 3- FINISH ALL OVER 125.
 4- .01 MAX. CONCAVITY PERMITTED.

Figure 29

ORDNANCE PART NO. 8830949

CUP

8830949

ORDNANCE CORPS
 DEPT OF THE ARMY
 DOVER, NEW JERSEY

DATE: 9-20-65
 BY: A
 APPROVED: A

REVISIONS

DESCRIPTION: EODR-40 S.C.

DATE: 9-20-65
 BY: A
 APPROVED: A

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 FRACTIONS DECIMALS ANGLES

DATE: 9-20-65
 BY: A
 APPROVED: A

SEE NOTE 2

PROTECTIVE FINISH

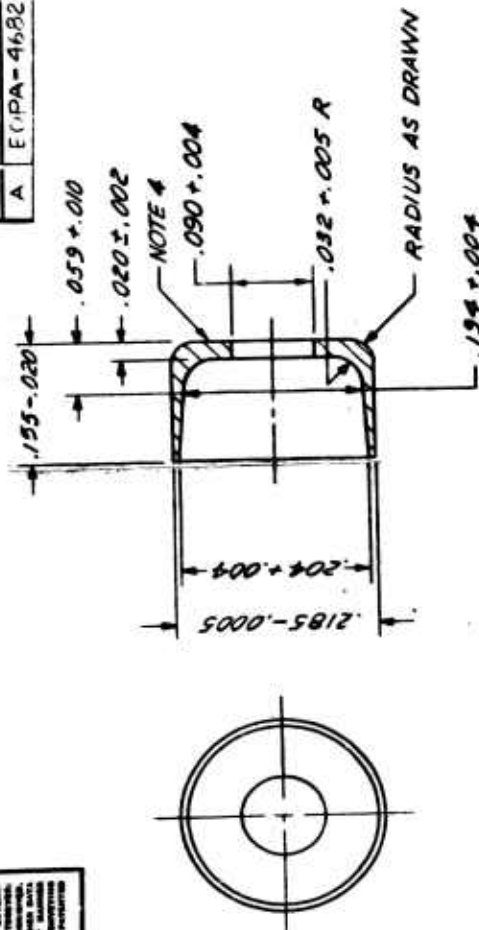
DO NOT APPLY FINISH TO EXPOSED SURFACES

U.S. GOVERNMENT PRINTING OFFICE: 1964
100-100-100

NOTES: -
1- SPEC MIL-G-2550, MIL-STD-10, AND MIL-STD-8 APPLY.
2- MATERIAL: - ALUMINUM ALLOY, SHEET, TEMPER O,
SPEC QQ-A-318.
3- FINISH ALLOY 125.
4- .01 MAX CONCAVITY PERMITTED.

8830950

REVISIONS		DATE	APPROVAL
SYM	DESCRIPTION		
A	ECIPA-4682	9-2-64	



58

ORDNANCE PART NO. 8830950

Figure 30

(A)

ORDNANCE PART NO. 8830950		FERRULE		PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY DOVER, NEW JERSEY	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGLES		ORIGINAL DATE OF DRAWING APRIL 1960		DRAWN BY B	
PHYSICAL PROPERTIES		REVISIONS		SHEET OF	
TEMP	TS	REVISIONS		8830950	
EL 2	RA	REVISIONS		B	
BM	RM	REVISIONS		A-12	
CAP BLASTING		REVISIONS		UNIT WT	
SPEC ENG. REC.		REVISIONS		SCALE	
SEE ENGINEERING RECORDS		REVISIONS		A-12	
APPLY PART NO.		REVISIONS		A-12	
APPLY PART NO.		REVISIONS		A-12	

F8822497

10-15-50
10-15-50

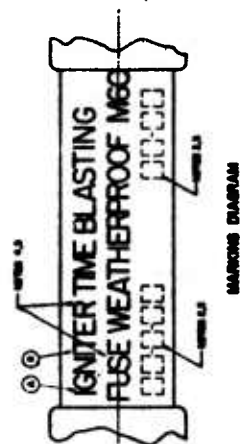
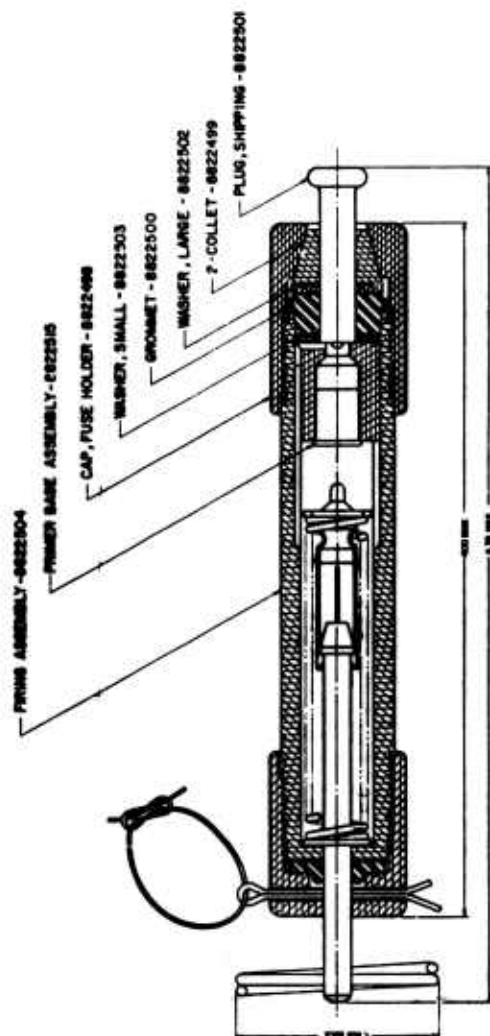


Figure 31

F8822497	
10-15-50	10-15-50
MARCONI DIAGRAM	
IGNITER TIME BLASTING	
FUSE WEATHERPROOF M68	
000000	
000000	
1.10 INCH	
1.10 INCH	

REVISIONS			
SYN	DESCRIPTION	DATE	APPROVAL
A	EO-PA 2807	10-10-67	10-10-67
B	EO-PA 4009	10-10-67	10-10-67

60

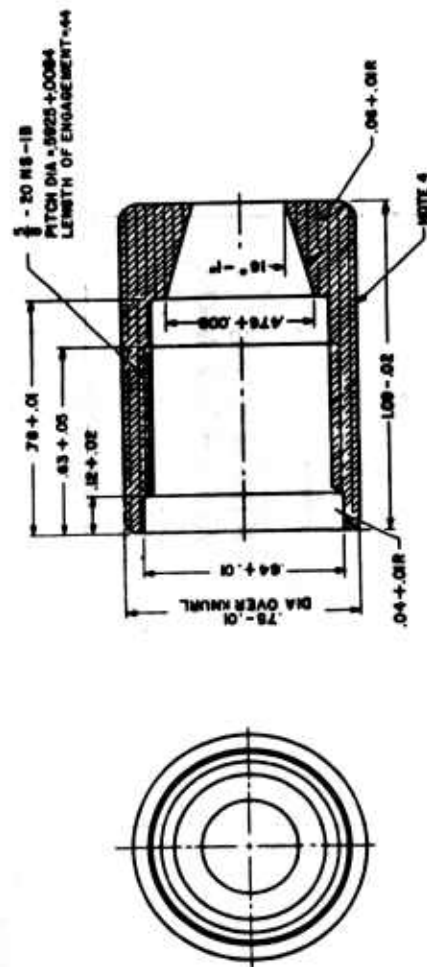


Figure 32

NOTES:-

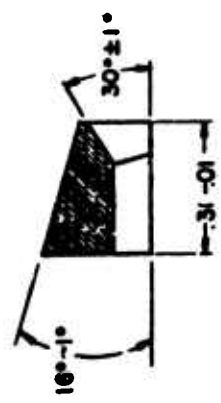
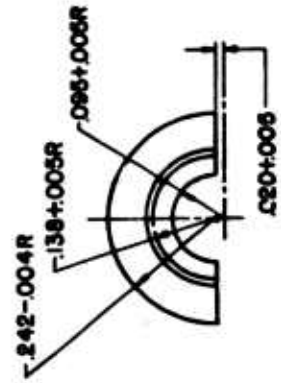
- 1- SPEC. ML - 6-2550, ML-STD-9 AND ML-STD-10 APPLY.
- 2- MATERIAL - PLASTIC, NYLON SPEC. ML-9-107091.
- 3- THE COLOR SHOULD BE SIMILAR TO COLOR, GREEN NO. 34-086 OR NO. 34-087, FEO-STD NO. 594, OR INTERMEDIATE SHADES WHICH SHALL BE GOVERNED BY SWANSELL COLORS, HUE 5.0Y TO 7.5Y VALUES 2-4, CHROMAS 2-4.
- 4- STRAIGHT NUMRL .032 PITCH, .015 DEEP FULL LENGTH, ML-STD-10 DOES NOT APPLY.

[illegible]

00 1 APR 54 1176

1. (1) When other than in accordance with a technical specification, or other data are used in the design of a product, the design engineer shall be responsible for the design of the product. The design engineer shall be responsible for the design of the product, and the design engineer shall be responsible for the design of the product.

REVISIONS		
REV	DESCRIPTION	DATE
A	EO-PA 2507	8-29-59
B	EO-PA 4009	4-29-60



- NOTES:-
- 1 - SPEC MIL-G-2550 APPLIES.
 - 2 - MATERIAL:- PLASTIC, NYLON, SP-6 MIL-P-17091.
 - 3 - THE COLOR SHALL BE SIMILAR TO COLOR, GREEN NO. 34086 OR NO. 34087, FED. STD 595, OR INTERMEDIATE SHADES WHICH SHALL BE GOVERNED BY MUNSELL COLORS, HUE 5.0Y TO 7.5Y, VALUES 2-4, CHROMAS 2-4.

Figure 33

ORDNANCE PART NO. 8822499

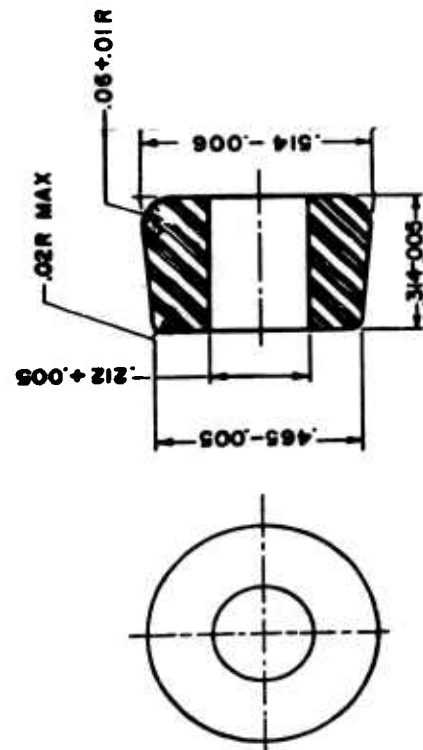
COLLET		ORDNANCE PART NO. 8822499	
SEE ENGINEERING RECORDS		PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY DOVER, NEW JERSEY	
DO NOT		8822499	
APPLICATION		UNIT WT	
SCALE		A-15	
ORIGINAL DATE OF DRAWING		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS ON DECIMALS ANGLES		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
PHYSICAL PROPERTIES		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
TEMPERATURE		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
STRENGTH		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
ELONGATION		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
IMPACT		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
HAZARD		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	
APPLICATION		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE	

8822500

FORM 1 APR 54 1176

REVISIONS		
REV	DESCRIPTION	DATE
A	EO-PA 2507	5-29-58
B	EO-PA 4009	4-29-60

NOTES: 1 - This drawing is for the purpose of showing the general appearance of the item and is not intended to be used for manufacturing purposes. 2 - This drawing is for the purpose of showing the general appearance of the item and is not intended to be used for manufacturing purposes.



NOTES:-
1 - SPEC MIL-G-2550 APPLIES.
2 - MATERIAL:- RUBBER, TYPE R, CLASS RS, GRADE NO. RS 609, A, B, FF, SPEC MIL-R-3065.

Figure 34

A B

ORDNANCE PART NO. 8822500

F8822497		ENTER TIME BLASTING FUSE, W/		PHYSICAL PROPERTIES		UNLESS OTHERWISE SPECIFIED		ORIGINAL DATE OF DRAWING APRIL 17, 1959	
SEE ENGINEERING RECORDS		WATER W/		TEMP		DIMENSIONS IN INCHES		SHAFTMAN WDS	
WATER W/		WATER W/		TENSILE		FRACTIONS		CHECKED	
APPLICATION		WATER W/		ELC		DECIMALS		EXAM	
APPLY PART NO		WATER W/		HA		MATERIAL		SUGGESTED	
WATER W/		WATER W/		SH		SEE NOTE 2		APPROVED BY NAME OF THE	
WATER W/		WATER W/		SH		HEAT TREATMENT		OFFICE OF THE	
WATER W/		WATER W/		SH		FINAL PROTECTIVE FINISH		B. Remy	

PICATINNY ARSENAL
ORDNANCE CORPS
DEPT OF THE ARMY
DOVER, NEW JERSEY

8822500

GROMMET

SCALE 1/4" = 1" WGT W/ A-16

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

PHYSICAL PROPERTIES		DO NOT DO	APPLY PART NO. AS SPECIFIED	REVISIONS			
YP	TS	APPLICATION		SYM	DESCRIPTION	DATE	APPROVAL
				A	ED PA-2507	5-23-53	
				B	ED PA-4009	4-20-59	
EL2							
RA							
BN							
BN							

WASHER
 $.25 \pm .01 \text{ ID} \times .95 - .01 \text{ OD} \times .050 - .005 \text{ THICK}$

NOTES:-

- 1-SPEC MIL-8-2550 APPLIES.
- 2-MATERIAL:-PLASTIC, NYLON, SPEC MIL-P-17091.
- 3-THE COLOR SHALL BE SIMILAR TO COLOR, GREEN NO. 34006 OR NO. 34007, FED-STD-395, OR INTERMEDIATE SHADES WHICH SHALL BE GOVERNED BY MURRELL COLORS, HUE 5.0Y TO 7.5Y, VALUES 2-4, CHROMA 2-4.

Figure 35

ORDNANCE PART NO. 8822502

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES		ORIGINAL DATE OF DRAWING APR 17, 1959		WASHER, LARGE		PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY DOVER, NEW JERSEY	
MATERIAL SEE NOTE 2		DRAFTSMAN J. P. CHECKED J. P. APPROVED J. P.					
HEAT TREATMENT		SUBMITTED		SCALE		BY 1 SIZE	
FINAL PROTECTIVE FINISH		APPROVED BY ORDER OF THE CHIEF OF ORDNANCE		UNIT WT A-17		8822502	

NOTICE:--When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

PHYSICAL PROPERTIES		DO NOT DO	APPLY PART NO. AS SPECIFIED	REVISIONS			
VP	TS	APPLICATION		SYM	DESCRIPTION	DATE	APPROVAL
		NEXT ASSY	USED ON	A	EO PA-2507	5-23-59	<i>[Signature]</i>
		F8822497	IGNITER, TIME DELAYING FUSE WEATHERPROOF MSO	B	EO PA-4009	4-29-60	<i>[Signature]</i>

WASHER

.218 + .005 ID x .430 - .005 OD x .050 - .005 THICK

NOTES:-

- 1-SPEC MIL-G-2550 APPLIES.
- 2-MATERIAL:-PLASTIC, NYLON, SPEC MIL-P-17091.
- 3-THE COLOR SHALL BE SIMILAR TO COLOR, GREEN NO. 34006 OR NO. 34007, FED-STD-595, OR INTERMEDIATE SHADES WHICH SHALL BE GOVERNED BY MUNSSELL COLORS, HUE 5.0Y TO 7.5Y, VALUES 2-4, CHROMAS 2-4.

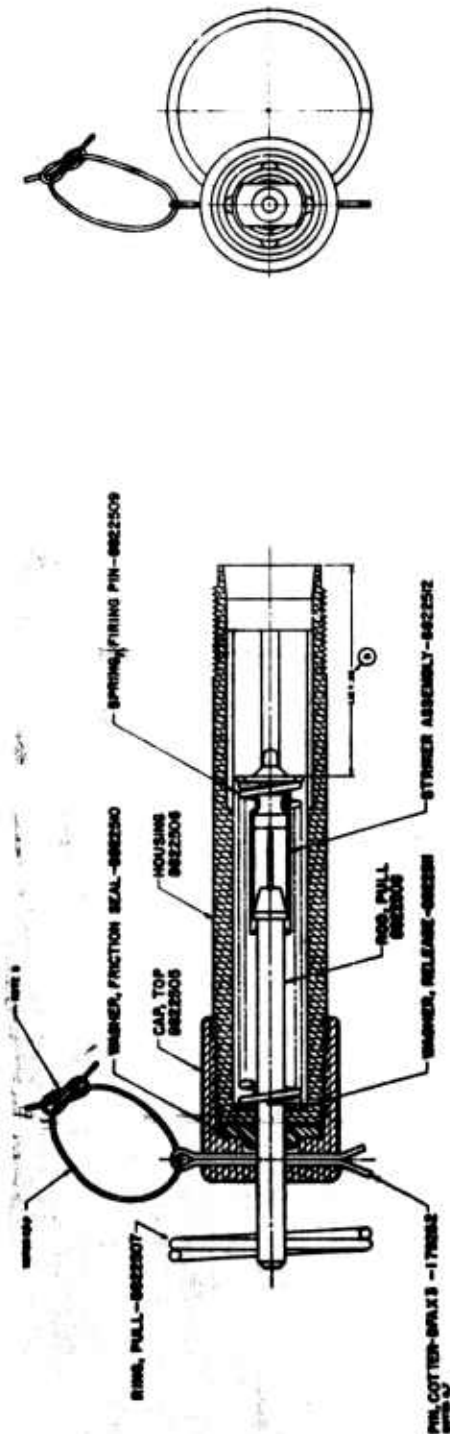
Figure 36

ORDNANCE PART NO. 8822503

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	OF FINAL DATE OF DRAWING APR 17, 1999	PICATINNY ARSENAL ORDNANCE CORPS DEPT OF THE ARMY DOVER, NEW JERSEY
	DRAFTSMAN: <i>[Signature]</i> CHECKED: <i>[Signature]</i>	
MATERIAL SEE NOTE 2	TRACED: <i>[Signature]</i> CHECKED: <i>[Signature]</i>	WASHER, SMALL
HEAT TREATMENT	ENGR: <i>[Signature]</i> CHECKED: <i>[Signature]</i>	
FINAL PROTECTIVE FILM	SUBMITTED: <i>[Signature]</i>	SCALE
	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE <i>B. K. King</i> ORN CORPS	UNIT WT
		8822503
		SHEET OF

F 8822504

10-14-1967
10-14-1967



1- RING, PULL-8822507
2- WASHER, FRICTION SEAL-8822509
3- CAP, TOP 8822505
4- HOUSING 8822506
5- SPRING, FIRING PIN-8822509
6- STRIKER ASSEMBLY-8822512
7- PIN, COTTER-PIN-X-177045

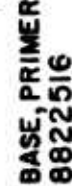
Figure 37

F 8822504		FIRING ASSEMBLY		F 8822504	
1	RING, PULL-8822507	1	WASHER, FRICTION SEAL-8822509	1	CAP, TOP 8822505
2	WASHER, FRICTION SEAL-8822509	2	HOUSING 8822506	2	SPRING, FIRING PIN-8822509
3	CAP, TOP 8822505	3	STRIKER ASSEMBLY-8822512	3	PIN, COTTER-PIN-X-177045
4	HOUSING 8822506	4		4	
5	SPRING, FIRING PIN-8822509	5		5	
6	STRIKER ASSEMBLY-8822512	6		6	
7	PIN, COTTER-PIN-X-177045	7		7	

1

1

-PRIMER, PERCUSSION M39AI-8798919



1- SPEC MIL-G-2550 APPLIES.
2- SPEC PA-PD-1735 APPLIES EXCEPT THE
FUNCTIONING LIMIT $\bar{H} + 5S$ SHALL NOT
EXCEED 13 INCHES

Figure 38

ORDNANCE PART NO. 8822515

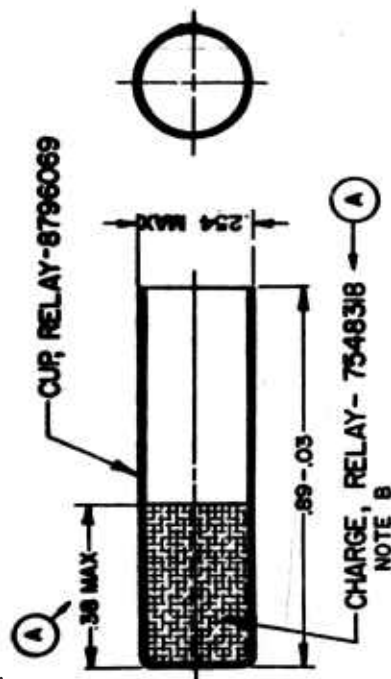
[illegible]

DD FORM 1176
1 APR 64

NOTE: - When Engineering Records, Specifications, or other data are used for the design and construction of a device, the designer must ensure that the data is current and applicable to the device. The designer must also ensure that the data is properly interpreted and that the device is constructed in accordance with the data. The designer must also ensure that the device is tested in accordance with the data and that the results of the tests are properly interpreted and that the device is approved for use in accordance with the data.

(A) U.S. PAT. 3,620,201

REV.	REVISIONS	DATE	APPROVAL
A ₀	REP TO C8796064 ADDED, CHG AND NOTE CHANGED & REVISED TO CONFORM TO ORDN 4-41 & JAN 1 64	8-8-57	W.H. 22
B	89-035 1961	3-20-59 U.S. SLC	



NOTES:-

A - SPEC MIL-G-2550 APPLIES.

B - LOAD WITH 350 MILLIGRAMS (5.4 GRAINS) MINIMUM, ADVISORY 390 MILLIGRAMS (6 GRAINS) MEAN WEIGHT, PETN, CLASS A, SPEC JAN-P-387, MOISTURE CONTENT $\pm 2\%$ MAX, PRESS AT 8,000 PSI.

Figure 39

PART NO. 8796061

SEE ENGINEERING RECORDS	PHYSICAL PROPERTIES	UNLESS OTHERWISE SPECIFIED	ORIGINAL DATE OF DRAWING
8796061	YP	DIMENSIONS ARE IN INCHES	APR 28, 1956
8796064	TS	TOLERANCES ON FRACTIONS	CHALLENGE
8796069	EL2	DECIMALS	W.H. 22
8796064	RA	ANGLES	W.H. 22
8796064	SH	MATERIAL	W.H. 22
8796064	PH	HEAT TREATMENT	W.H. 22
8796064	PH	FINAL PROTECTIVE FINISH	W.H. 22

APPROVED BY ORDER OF THE
W.H. 22

ORDNANCE CORPS
DEPT OF THE ARMY
PICATINNY ARSENAL
DOVER, NEW JERSEY

8796061

SHEET 1 OF 1

B

RELAY
ASSEMBLY

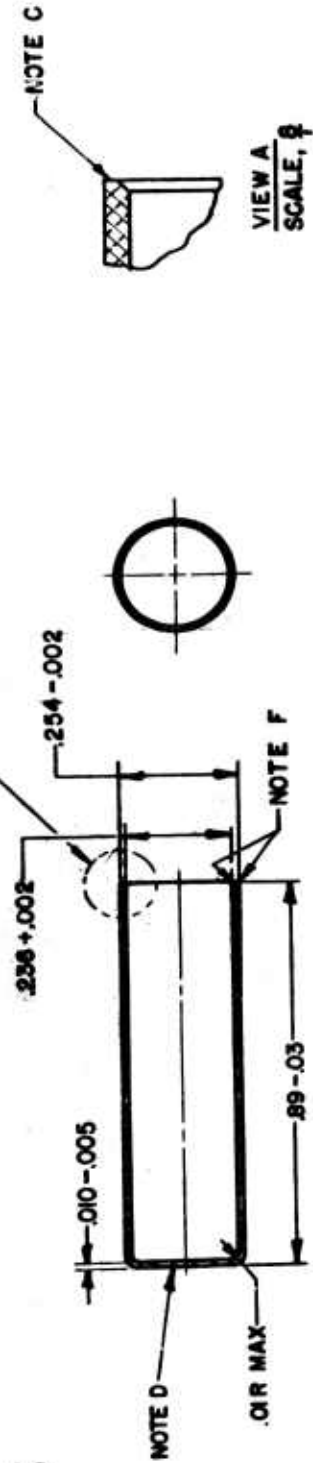
SCALE 4/1 UNIT WT. A-21

60, 1, 2, 3, 4, 1178

NOTE: - When Dimensional Drawings, Specifications, or other data are used for the design of a part or assembly, it is the responsibility of the designer to ensure that the data is correct and that the part or assembly is designed to meet the requirements of the drawing. The designer is responsible for the design of the part or assembly and for the selection of the materials and the manufacturing process. The designer is also responsible for the design of the part or assembly and for the selection of the materials and the manufacturing process.

ITEM	REVISION	DATE	APPROVAL
A ₁	REF TO 8 8796061 ADDS 8 REV ED TO CONFORM TO ORDM 4-4; 8D-04C 1189	8-8-87	WJL
B	EO-CAL 1821	3-80-89	WJL

SEE VIEW A



NOTES:-

- A - SPEC MIL-G-2550 APPLIES.
- B - MATERIAL:- ALUMINUM-ALLOY, SHEET, TEMPER Q, SPEC QQ-A-318 OR QQ-A-359.
- C - THE THICKNESS OF THE TRIMMED EDGE OF THE CUP SHOULD NOT EXCEED ONE-HALF THE NOMINAL WALL THICKNESS. ALL REDUCTION IN WALL THICKNESS SHOULD BE REFLECTED AS AN INCREASE IN INSIDE DIAMETER.
- D - 01 CONCAVITY OR CONVEXITY PERMITTED.
- E - TO BE CAPABLE OF BEING FLATTENED ALONG ITS AXIS WITHOUT FRACTURING.
- F - NO SHARP EDGES PERMITTED

Figure 40

PART NO. 8796069

SEE ENGINEERING RECD OF D8		PHYSICAL PROPERTIES		UNLESS OTHERWISE SPECIFIED		ORIGINAL DATE OF DRAWING	
8796061	WATER	YP	TS	EL	RA	BM	RM
8796061	NO. 1	TS	EL	RA	BM	RM	RM
8796061	NO. 2	TS	EL	RA	BM	RM	RM
8796061	NO. 3	TS	EL	RA	BM	RM	RM
8796061	NO. 4	TS	EL	RA	BM	RM	RM
8796061	NO. 5	TS	EL	RA	BM	RM	RM
8796061	NO. 6	TS	EL	RA	BM	RM	RM
8796061	NO. 7	TS	EL	RA	BM	RM	RM
8796061	NO. 8	TS	EL	RA	BM	RM	RM
8796061	NO. 9	TS	EL	RA	BM	RM	RM
8796061	NO. 10	TS	EL	RA	BM	RM	RM
8796061	NO. 11	TS	EL	RA	BM	RM	RM
8796061	NO. 12	TS	EL	RA	BM	RM	RM
8796061	NO. 13	TS	EL	RA	BM	RM	RM
8796061	NO. 14	TS	EL	RA	BM	RM	RM
8796061	NO. 15	TS	EL	RA	BM	RM	RM
8796061	NO. 16	TS	EL	RA	BM	RM	RM
8796061	NO. 17	TS	EL	RA	BM	RM	RM
8796061	NO. 18	TS	EL	RA	BM	RM	RM
8796061	NO. 19	TS	EL	RA	BM	RM	RM
8796061	NO. 20	TS	EL	RA	BM	RM	RM
8796061	NO. 21	TS	EL	RA	BM	RM	RM
8796061	NO. 22	TS	EL	RA	BM	RM	RM
8796061	NO. 23	TS	EL	RA	BM	RM	RM
8796061	NO. 24	TS	EL	RA	BM	RM	RM
8796061	NO. 25	TS	EL	RA	BM	RM	RM
8796061	NO. 26	TS	EL	RA	BM	RM	RM
8796061	NO. 27	TS	EL	RA	BM	RM	RM
8796061	NO. 28	TS	EL	RA	BM	RM	RM
8796061	NO. 29	TS	EL	RA	BM	RM	RM
8796061	NO. 30	TS	EL	RA	BM	RM	RM
8796061	NO. 31	TS	EL	RA	BM	RM	RM
8796061	NO. 32	TS	EL	RA	BM	RM	RM
8796061	NO. 33	TS	EL	RA	BM	RM	RM
8796061	NO. 34	TS	EL	RA	BM	RM	RM
8796061	NO. 35	TS	EL	RA	BM	RM	RM
8796061	NO. 36	TS	EL	RA	BM	RM	RM
8796061	NO. 37	TS	EL	RA	BM	RM	RM
8796061	NO. 38	TS	EL	RA	BM	RM	RM
8796061	NO. 39	TS	EL	RA	BM	RM	RM
8796061	NO. 40	TS	EL	RA	BM	RM	RM
8796061	NO. 41	TS	EL	RA	BM	RM	RM
8796061	NO. 42	TS	EL	RA	BM	RM	RM
8796061	NO. 43	TS	EL	RA	BM	RM	RM
8796061	NO. 44	TS	EL	RA	BM	RM	RM
8796061	NO. 45	TS	EL	RA	BM	RM	RM
8796061	NO. 46	TS	EL	RA	BM	RM	RM
8796061	NO. 47	TS	EL	RA	BM	RM	RM
8796061	NO. 48	TS	EL	RA	BM	RM	RM
8796061	NO. 49	TS	EL	RA	BM	RM	RM
8796061	NO. 50	TS	EL	RA	BM	RM	RM
8796061	NO. 51	TS	EL	RA	BM	RM	RM
8796061	NO. 52	TS	EL	RA	BM	RM	RM
8796061	NO. 53	TS	EL	RA	BM	RM	RM
8796061	NO. 54	TS	EL	RA	BM	RM	RM
8796061	NO. 55	TS	EL	RA	BM	RM	RM
8796061	NO. 56	TS	EL	RA	BM	RM	RM
8796061	NO. 57	TS	EL	RA	BM	RM	RM
8796061	NO. 58	TS	EL	RA	BM	RM	RM
8796061	NO. 59	TS	EL	RA	BM	RM	RM
8796061	NO. 60	TS	EL	RA	BM	RM	RM
8796061	NO. 61	TS	EL	RA	BM	RM	RM
8796061	NO. 62	TS	EL	RA	BM	RM	RM
8796061	NO. 63	TS	EL	RA	BM	RM	RM
8796061	NO. 64	TS	EL	RA	BM	RM	RM
8796061	NO. 65	TS	EL	RA	BM	RM	RM
8796061	NO. 66	TS	EL	RA	BM	RM	RM
8796061	NO. 67	TS	EL	RA	BM	RM	RM
8796061	NO. 68	TS	EL	RA	BM	RM	RM
8796061	NO. 69	TS	EL	RA	BM	RM	RM
8796061	NO. 70	TS	EL	RA	BM	RM	RM
8796061	NO. 71	TS	EL	RA	BM	RM	RM
8796061	NO. 72	TS	EL	RA	BM	RM	RM
8796061	NO. 73	TS	EL	RA	BM	RM	RM
8796061	NO. 74	TS	EL	RA	BM	RM	RM
8796061	NO. 75	TS	EL	RA	BM	RM	RM
8796061	NO. 76	TS	EL	RA	BM	RM	RM
8796061	NO. 77	TS	EL	RA	BM	RM	RM
8796061	NO. 78	TS	EL	RA	BM	RM	RM
8796061	NO. 79	TS	EL	RA	BM	RM	RM
8796061	NO. 80	TS	EL	RA	BM	RM	RM
8796061	NO. 81	TS	EL	RA	BM	RM	RM
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8796061	NO. 83	TS	EL	RA	BM	RM	RM
8796061	NO. 84	TS	EL	RA	BM	RM	RM
8796061	NO. 85	TS	EL	RA	BM	RM	RM
8796061	NO. 86	TS	EL	RA	BM	RM	RM
8796061	NO. 87	TS	EL	RA	BM	RM	RM
8796061	NO. 88	TS	EL	RA	BM	RM	RM
8796061	NO. 89	TS	EL	RA	BM	RM	RM
8796061	NO. 90	TS	EL	RA	BM	RM	RM
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8796061	NO. 96	TS	EL	RA	BM	RM	RM
8796061	NO. 97	TS	EL	RA	BM	RM	RM
8796061	NO. 98	TS	EL	RA	BM	RM	RM
8796061	NO. 99	TS	EL	RA	BM	RM	RM
8796061	NO. 100	TS	EL	RA	BM	RM	RM

CUP, RELAY

ORDNANCE CORPS
DEPT OF THE ARMY
PICATINNY ARSENAL
DOVER, NEW JERSEY

0796069

SCALE 4/1 UNIT WT A-22

APPROVED BY CHIEF OF THE CORPS

FINAL PROTECTIVE FINISH

APPLY PART NO.

DO NOT

60

P-87318 C

[illegible]

LIST OF PARTS					DRAWING	
QTY	NAME OF PART	QTY ON	DIM	GRADE		DRAWING NUMBER
				A	C	
1	DRILL, PUNCHING	1	WOOD			MIL-4-45504
2	FILLER, END	A	COMPOSITION BOARD	TYPE I OR II		MIL-4-3106
3	FILLER, SIDE	A	COMPOSITION BOARD	TYPE I OR II		MIL-4-3106
4	FILLER, TOP & BOTTOM	A	COMPOSITION BOARD	TYPE I OR II		MIL-4-3106
5						
6	SEAL, CAR	1				REF-942
7						
8						
9						
10						
11						
12						
13						
14						

• THE SPECIFICATION INCLUDES DRAWING AND BASIC DIMENSIONS ONLY. WHEN A SPECIFICATION IS REVISED A LETTER IS AFFIXED TO ITS BASIC NUMBER.
A-AS REQUIRED.

NAME: _____

$6/1/52$ 01 = $6/1/54$ 14 = $6/1/51$ 41 = $6/8$ 170000
 $6/1/52$ 01 = $6/1/54$ 14 = $6/1/51$ 41 = $6/8$ 170000
 $6/1/52$ 01 = $6/1/54$ 14 = $6/1/51$ 41 = $6/8$ 170000

100

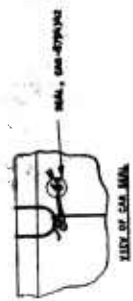
... on page 100

71153

15 1/8" x 13 1/8" x 1/16" THICK

FILED

STUDY 90171 - 13 JUL 86 - 1/16 THREE



WORKING INSTRUCTIONS

THE BOX SHALL BE MARKED IN ACCORDANCE WITH DRAWING CB756522.
THE ICC NOMENCLATURE TO BE APPLIED SHALL BE:-
"HIGH EXPLOSIVES-HAZARDOUS".
THE DESRIPTIVE NOMENCLATURE OF THE ITEM PACKED SHALL BE:-
"1-DEMOLITION KIT BLASTING GEL".
THE CRITICAL DISPLACEMENT SHALL BE:-
THE PSW AND DODIC SHALL BE:-

STOCKS AND BONDS: INVESTMENT (DO NOT PRINT ON PACKAGE)

THE EXPLOSIVE HAZARD (QUANTITY-DISTANCE) SHALL BE:-
THE STORAGE COMPATIBILITY SHALL BE:-
THE ICE MELT RILLOP LADING PURPOSES SHALL BE:-

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FORM BOX IN ACCORDANCE WITH SPECIFICATION MIL-Q-46505, FIGURE 8.
PLACE ONE CARTRIDGE
THREAT ONE FILLER AT EACH END, EACH SIDE, AND TOP AND BOTTOM. ALSO ADD
ADDITIONAL FILLERS IF REQUIRED FOR THREAT PROTECTIVE.
CLOSE AND SEAL THE BOX IN ACCORDANCE WITH SPECIFICATION MIL-Q-46505, FIGURE 9.
APPLY ONE SEAL WIRE AND THUNDER LAMP AS SHOWN

LINE NO.	LIST OF DRAWINGS	DRAWING NUMBER	WEIGHTS (ESTIMATED)		
			NO.	UNIT	POUNDS
1	SIZE, PENDING	CABLES	1	NO. INCLINE (LEFT)	7.0
2			2	BIT	10.0
3	DRAWING PLANNING & DRAINAGE, ETC.	CEMENT	3	CEMENT, ETC.	11.0
4			4		
5	SEAL, GASKET	SEALING	5	TOTAL	38.0
6					

THE EASTERN NEW ENGLAND COLLEGE

Figure 41

ORDNANCE PART NO. 8861840

[illegible]

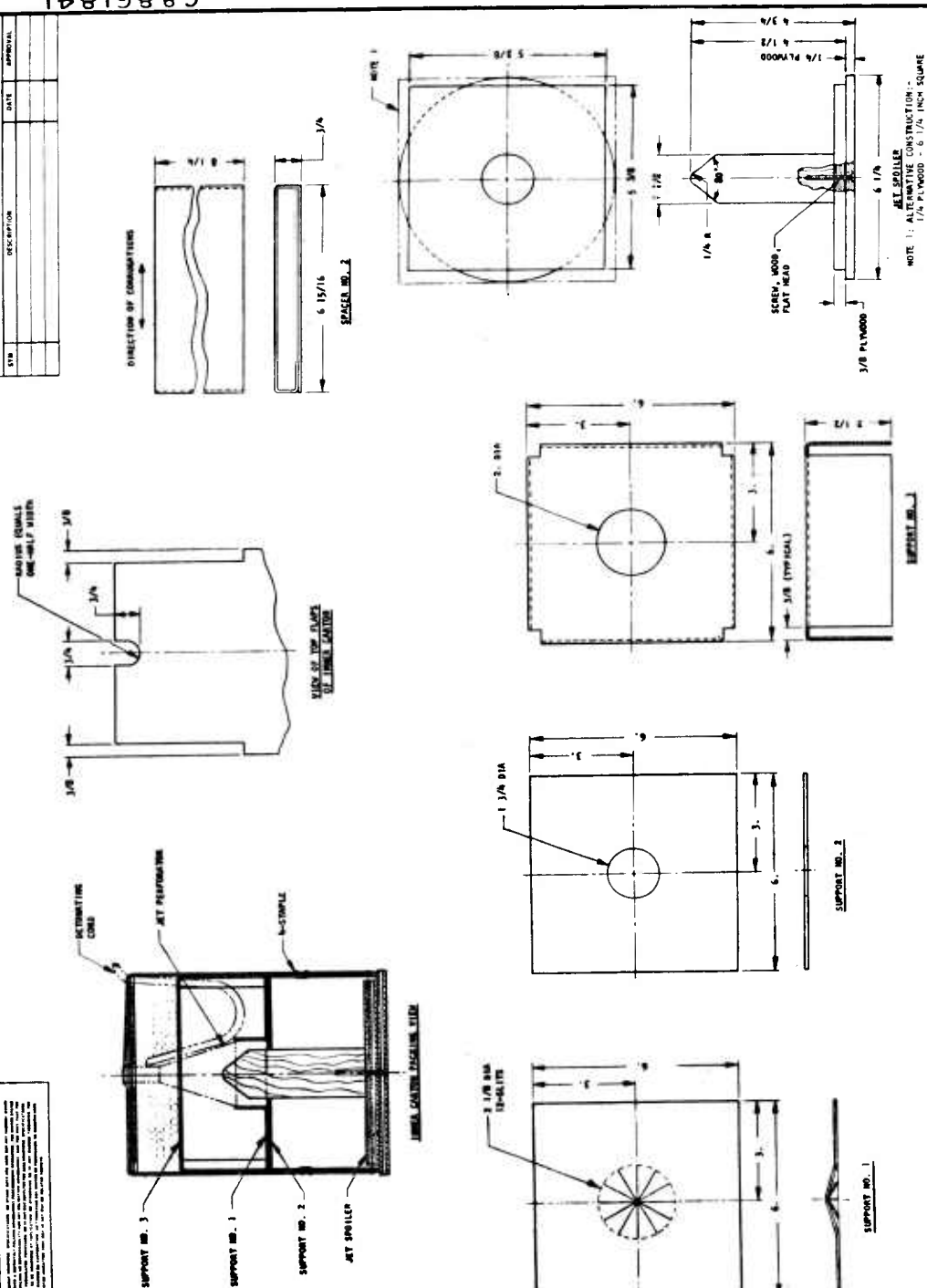
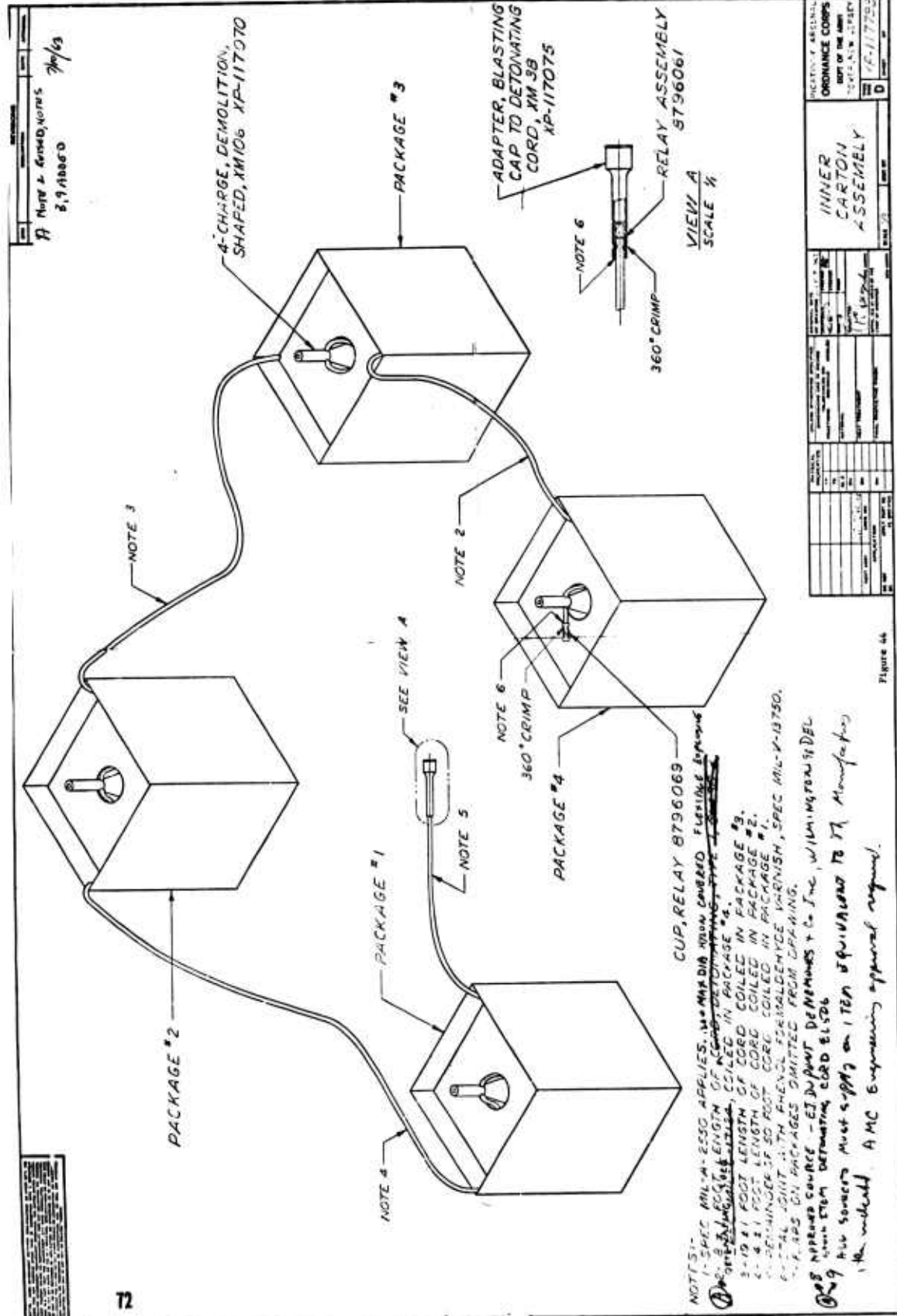
[illegible]

Figure 42

ORDNANCE PART NO. 8861841

[illegible]



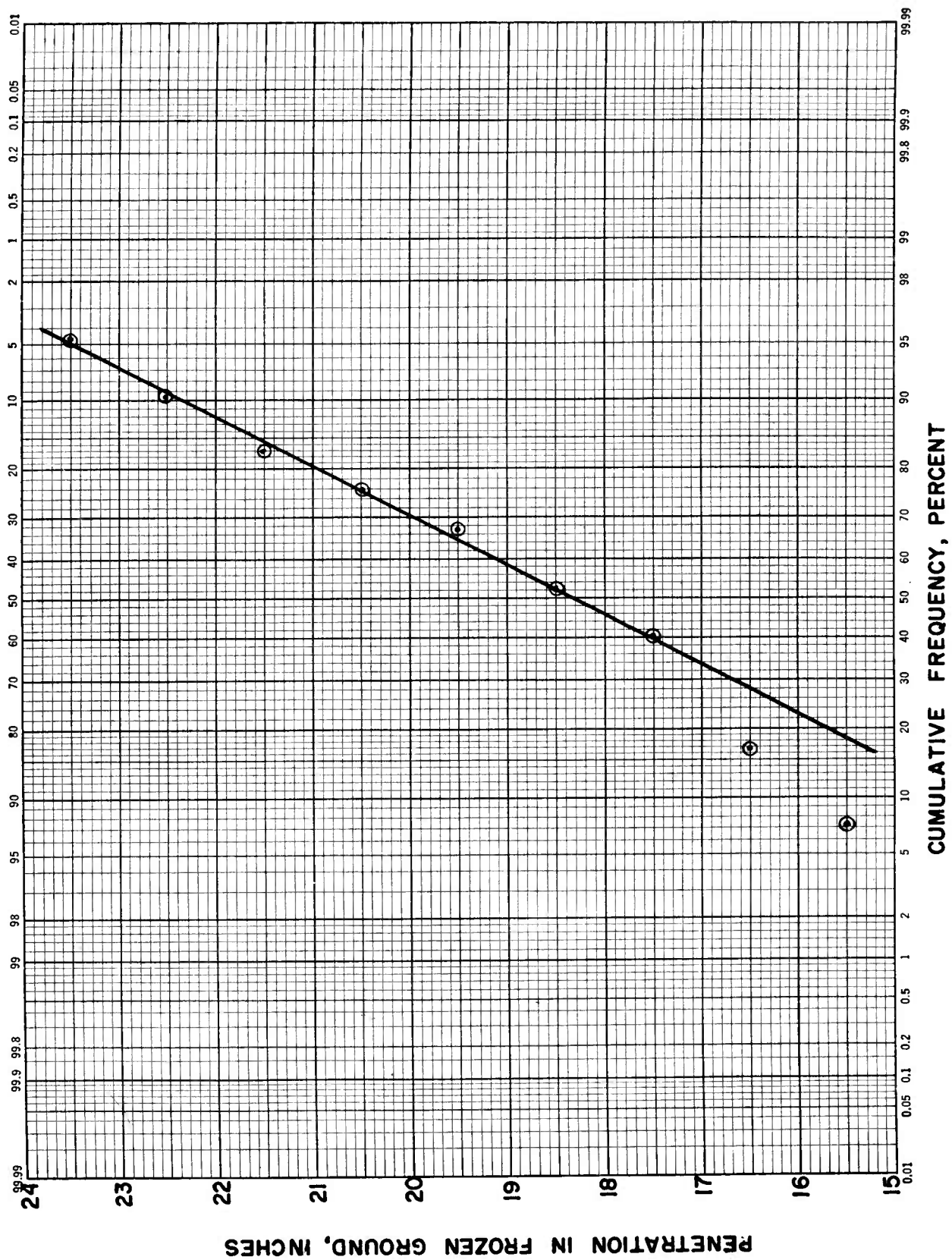


Figure 46

GRAPH 1 Penetrations in Frozen Ground

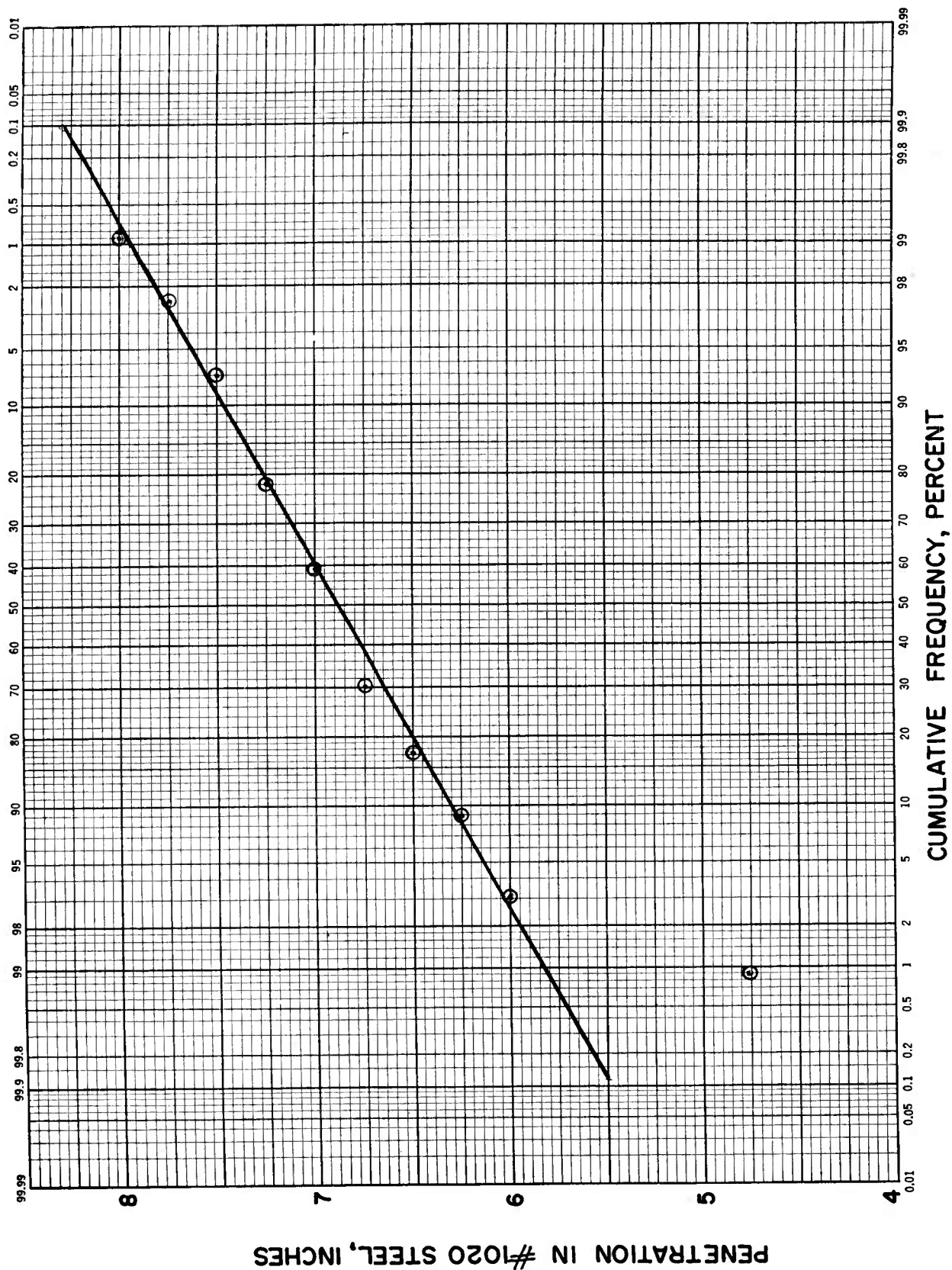
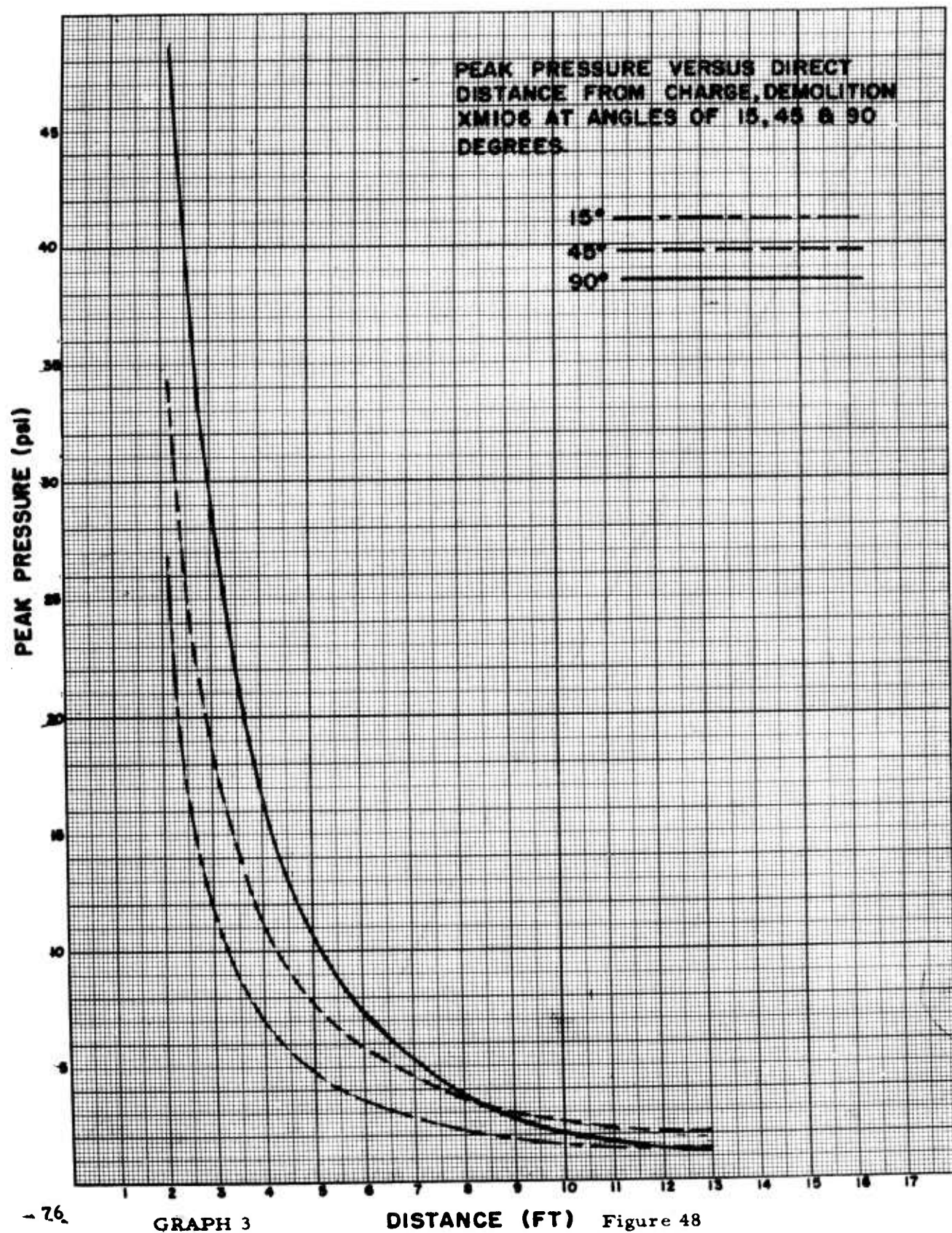
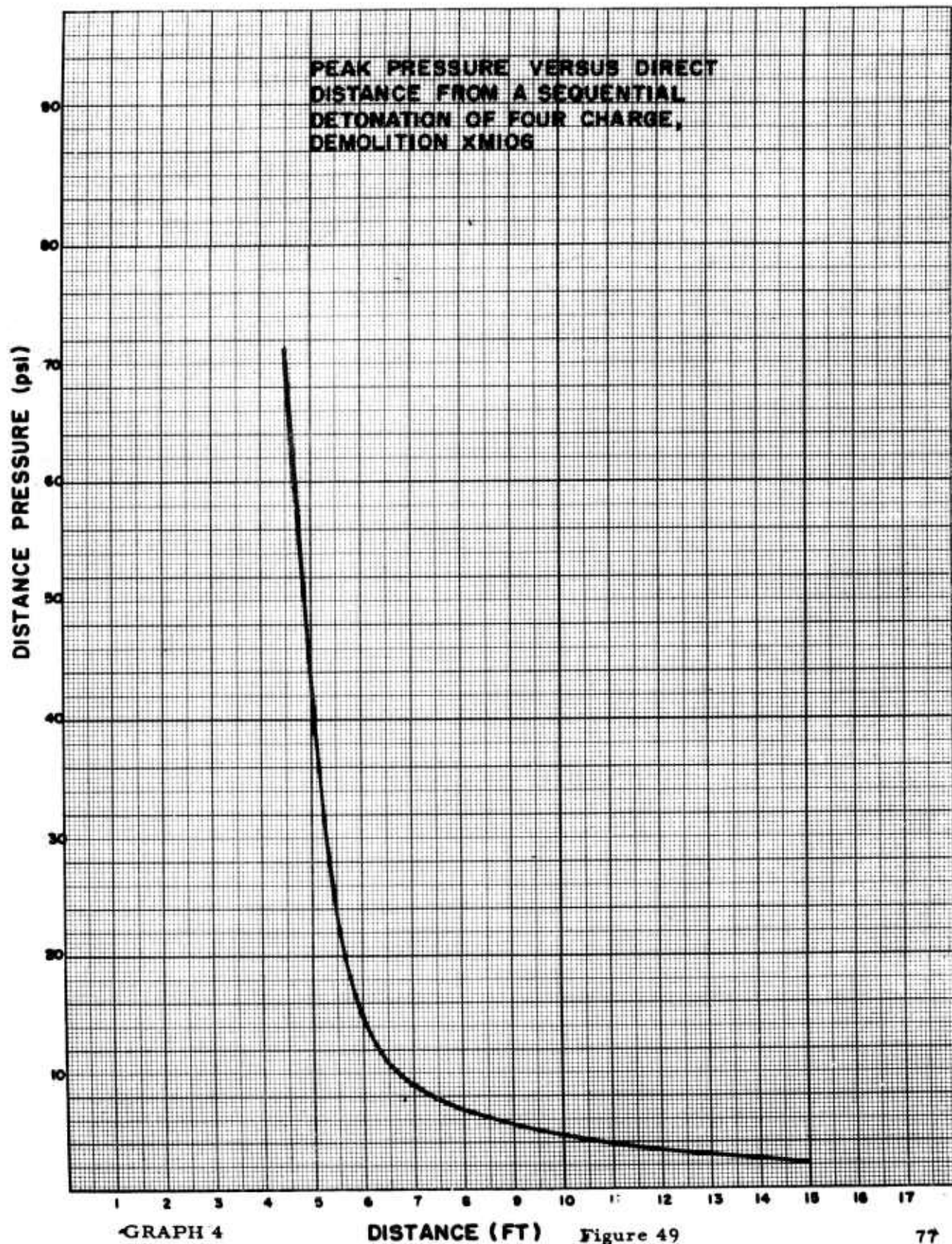


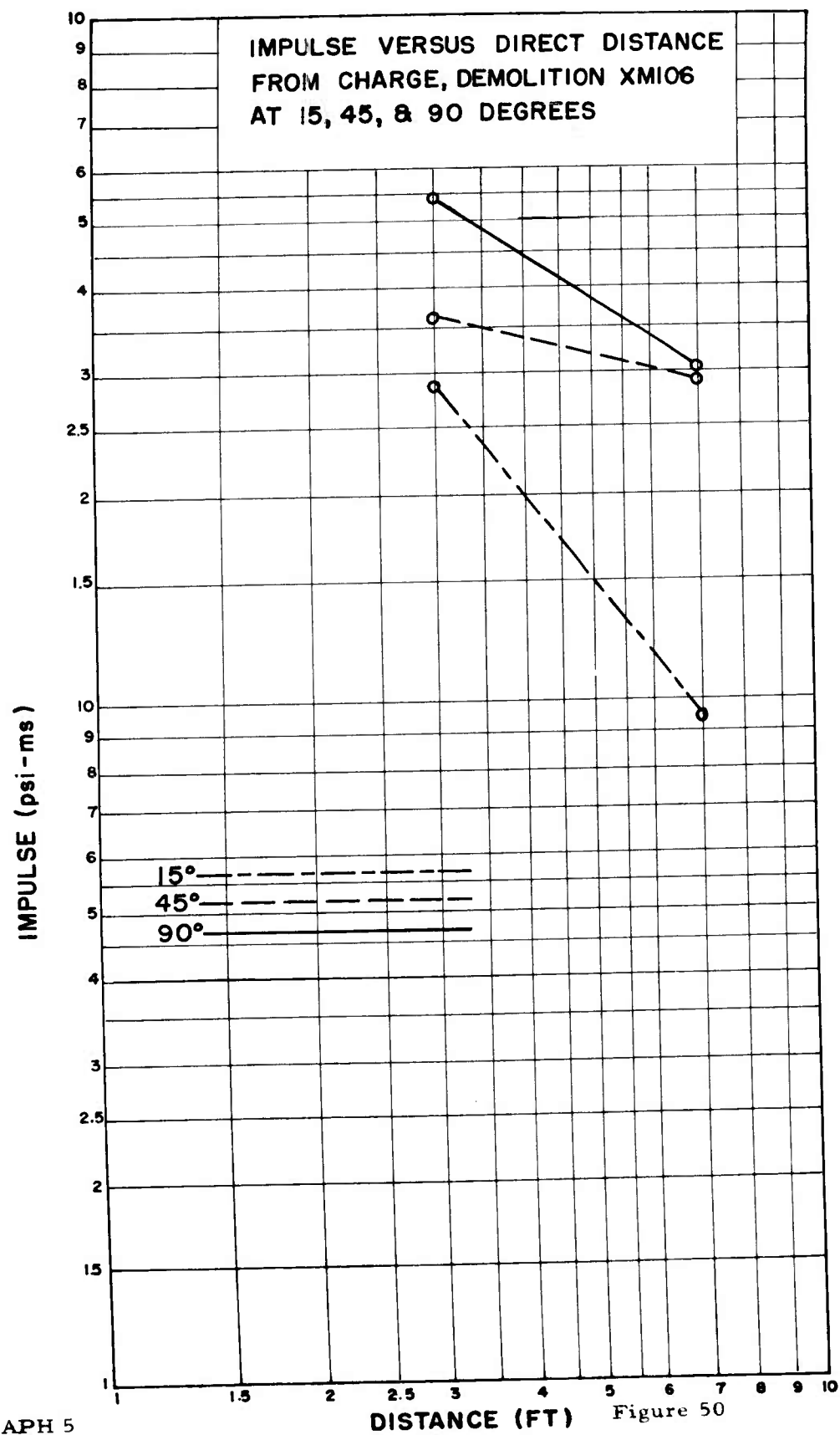
Figure 47
GRAPH2 Penetrations in #1020 Steel





GRAPH 4

DISTANCE (FT) Figure 49



APPENDIX C

PARTS LIST

PARTS LIST

<u>Name of Item</u>	<u>Item Dwg. No.</u>	<u>Item Spec No. and Date</u>	<u>Date of Dwg.</u>
1. Charge, Demolition, XM106	DXP-117070		11 Jan 62
2. Body	DXP-117071		11 Jan 62
3. Cone-Pellet Assembly	DXP-117072		11 Jan 62
4. Cone	BXP-117073		11 Jan 62
5. Booster Shell	BXP-117074		11 Jan 62
6. Adapter, Priming, XM38	BXP-117075		13 Feb 62
7. Sleeve	BXP-117076		12 Feb 62
8. Washer	AXP-117077		12 Feb 62
9. Washer, Retainer	AXP-117078		12 Feb 62
10. Cap, Blasting, Non-Electric, M7 Assembly	C8830948	MIL-C-45469A 30 Sept 60	1 Apr 60
11. Cup	C8830949		1 Apr 60
12. Ferule	B883095-		1 Apr 60
13. Igniter, Time Blasting Fuse, Weatherproof, M60	F8822497	MIL-I-394C 23 Aug 61	17 Apr 59
14. Cap, Fuse Holder	C8822498		17 Apr 59
15. Collet	B8822499		17 Apr 59
16. Grommet	B8822500		17 Apr 59
17. Washer, Large	A8822502		17 Apr 59
18. Washer, Small	A8822503		17 Apr 59
19. Firing, Assembly	F8822504		17 Apr 59
20. Primer Base Assembly	B8822515		17 Apr 59
21. Relay Assembly	B8796061		28 Apr 56
22. Cup, Relay	B8796069		28 Apr 56
23. Fuse, Blasting, Time, M700		MIL-F-45144 27 June 58	

PARTS LIST (CONTINUED)

<u>Name of Item</u>	<u>Item Dwg. No.</u>	<u>Item Spec. No. and Date</u>	<u>Date of Dwg.</u>
24. Cord, Detonating	DXP-117798		10 July 63
25. Box, Wirebound, Packing, Ammunition, for Demolition Kit, Blasting, XM175	Revision A		
26. Carton, Packing, Ammuni- tion, For Demolition Kit, Blasting, XM175	C8861840		16 Feb 62
27. Ignition Assembly	C8861841		16 Feb 62
28. Inner Carton Assembly	CXP-117799		3 July 62
	DXP-117798		10 July 63
	Revision A		

APPENDIX D

PROCEDURE FOR SETTING-UP AND
OPERATING DEMOLITION KIT, BLASTING, XM175

PROCEDURES FOR SETTING-UP AND OPERATING DEMOLITION KIT,
BLASTING, XM175 TO ANCHOR THE LITTLEJOHN LAUNCHER

1. Unpacking and setting-up the Demolition Kit:

- a. Have surveyor lay-off and mark positions for the four packages (Shaped Charges) in accordance with Figure one (1).

NOTE: If no surveyor is available, any suitable method of ascertaining the proper position for the charges as prescribed by figure one (1) is authorized. One such alternative method is to place the launcher in position, mark the position of each leg, and then move the launcher at least ten (10) feet away to provide working room and to prevent damage to the launcher during the subsequent functioning of the shaped charges.

- b. Remove the packed kit from its crate by bracing the crate with both feet, grasping one strap in each hand, and carefully lifting the kit from the crate (Figure 2).

- c. Tear the barrier paper from the package kit (Figure 3).

- d. Grasp the tab and pull toward the operator, thus removing the tape (Figure 4) and open the carton.

- e. Turn the carton upside down add gently dump its contents on the ground near the launcher-site (Figure 5). Discard the wooden jet spoilers (Figure 6).

- f. Place package one (1) in its proper position as predetermined during step a, Figure one (1).

NOTE: On a windy day, hold the cartons in position by placing any object on the cartons which has sufficient weight to hold them down.

- g. Remove the tape from package two (2) and open it (Figure 7).

- h. While one man holds package one (1) in position, have a second man place package two (2) in position as determined by step one (1) and shown on figure one (1), allowing primacord to uncoil from the top of package two (2), while carrying package three (3) and four (4) with him.

- i. Position packages three (3) and four (4) as indicated by figure one (1) and in the same manner as package two (2) was placed.

CAUTION: IN ORDER TO ALLOW FOR DIFFERENCES IN TERRAIN, AN EXCESS OF PRIMACORD IS FURNISHED. IF THE PRIMACORD IS ALLOWED TO FORM KINKS OR TIGHT COILS, PACKAGES BEYOND THE COIL MAY FAIL TO DETONATE. TO PREVENT SUCH AN OCCURRENCE, PULL THE PRIMACORD IN AN INWARD DIRECTION UNTIL SUCH COILS OR KINKS ARE REMOVED AND HOLD IN POSITION WITH A ROCK OR OTHER SUITABLE OBJECT AS SHOWN IN FIGURE SIX (6). THIS PROCEDURE IS TO BE FOLLOWED, AS REQUIRED, BETWEEN EACH OF THE PACKAGES (Figure 8).

j. Open package five (5) and remove its contents (Figure 9).

k. Remove tape and open package one (1). Unwind primacord with attached adapter from this package (Figure 9).

l. Hold the Adapter, XM38 (Figure 1) in one hand, and, with the other hand, push the blasting cap firmly into the open end of the adapter until it rests against the crimp which is near the closed end of the adapter (Figure 9).

2. Operation of the Demolition Kit:

a. Check the packages against figure one (1) to insure that they are properly positioned. Recheck primacord to assure that no kinks or tight coils are present.

b. Arm the igniter by pulling out the string attached to the safety cotter pin (Figure 10), thus removing the pin.

c. Fire the system by pulling outward (toward the operator) on the pull ring until it is heard to fire (Figure 10). (This will be further evident by the appearance of smoke.)

CAUTION: TAKE COVER IMMEDIATELY AFTER IGNITER FIRES (AT LEAST 40 FEET AWAY). THE XM106 DEMOLITION CHARGES WILL DETONATE APPROXIMATELY 40 SECONDS AFTER FIRING OF THE IGNITER.

d. In the event that the igniter fails to fire, reset it by pushing the pull-rod all the way in to re-engage the firing-pin, then pull outward on the pull-ring until the igniter is heard to fire.

FIG. 1

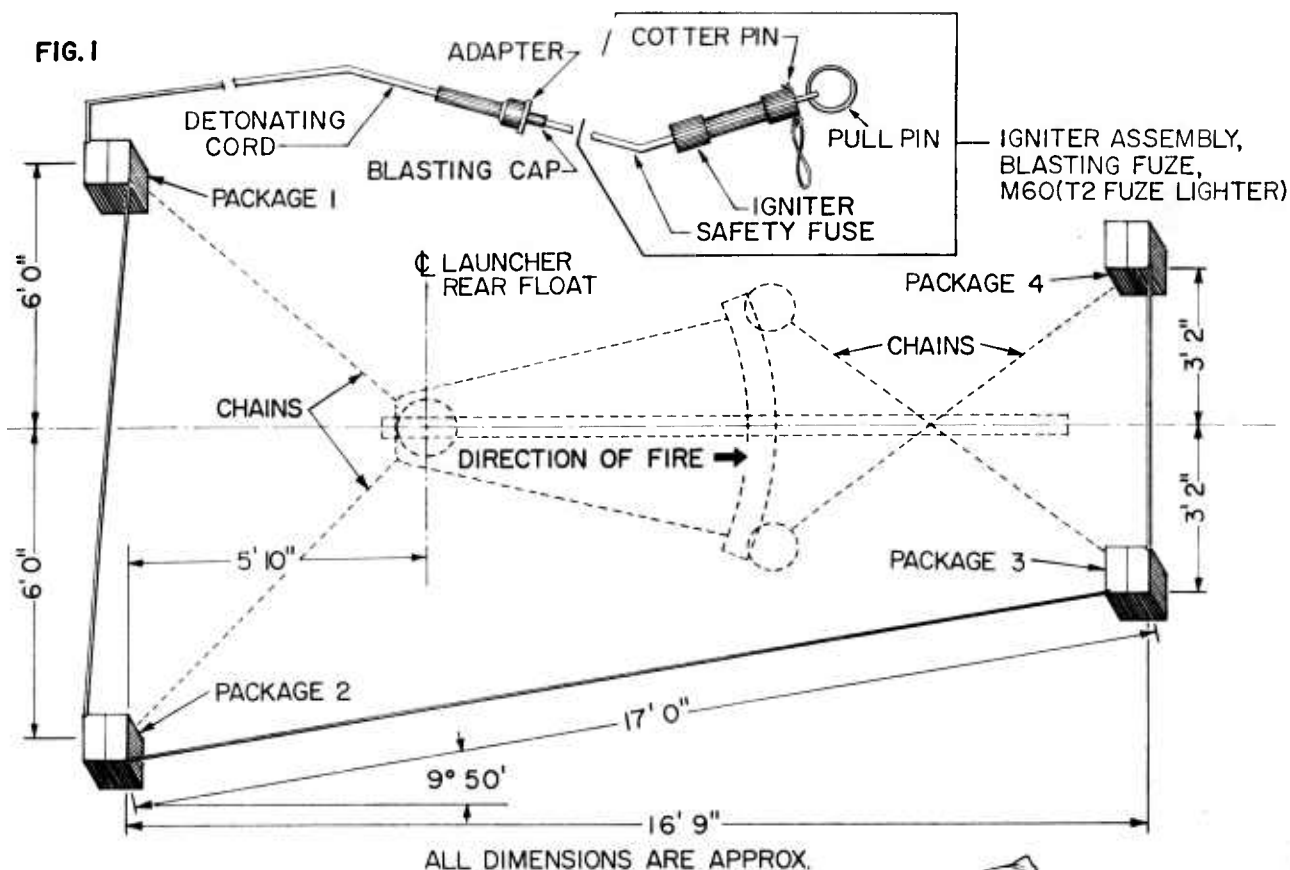


FIG. 2



FIG. 3

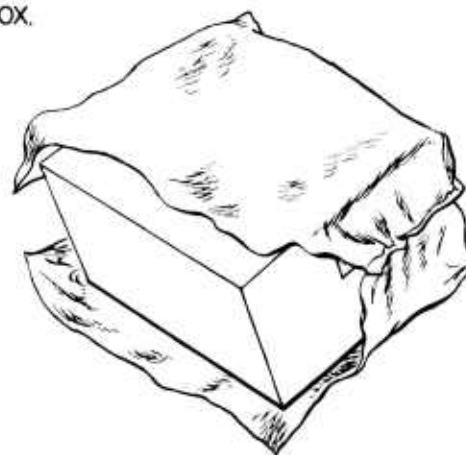
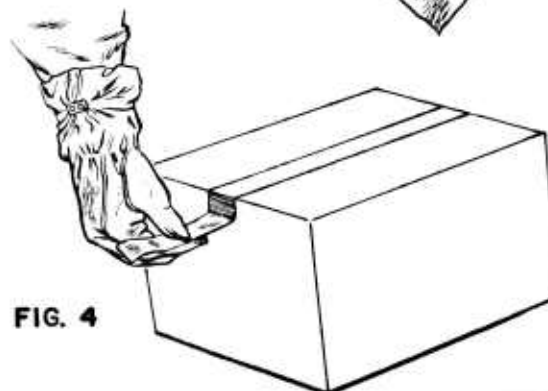


FIG. 4



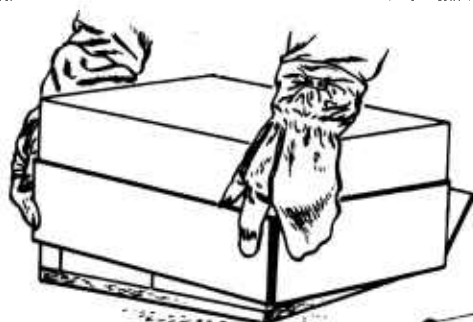


FIG. 5

FIG. 8

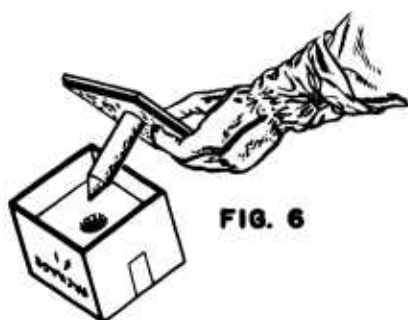
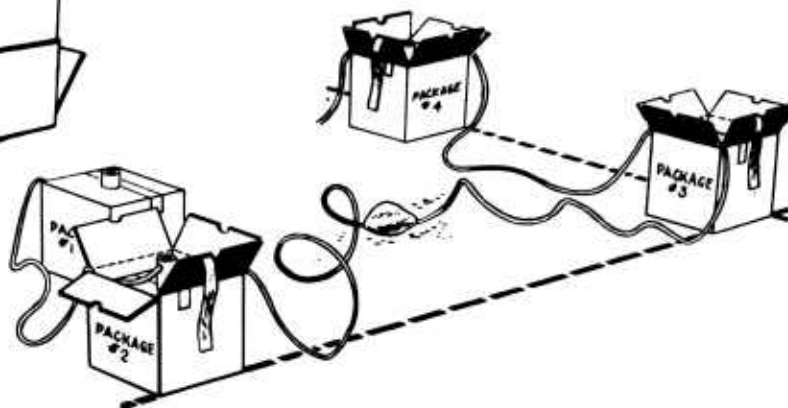


FIG. 6

FIG. 9

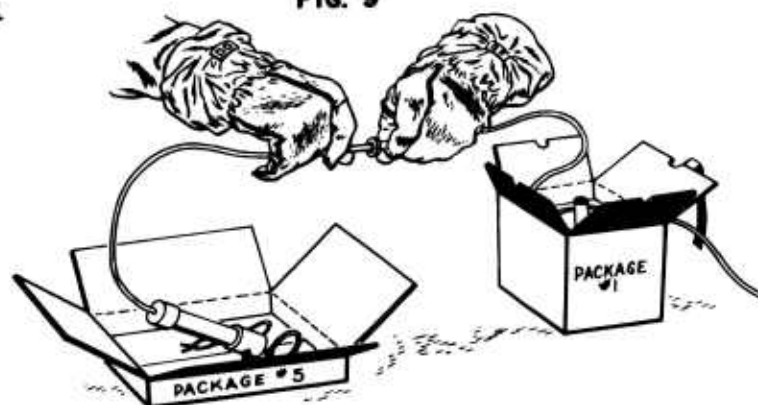
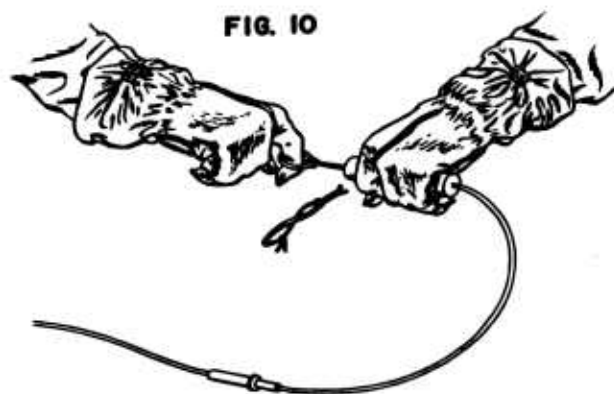


FIG. 7



FIG. 10



ABSTRACT DATA

ABSTRACT

Accession No. _____ AD _____

Picatinny Arsenal, Dover, New Jersey

DEVELOPMENT OF THE DEMOLITION KIT, BLASTING, XM175

Edmund Demberg

Technical Report 3075, September 1963, 88 pp, figures, tables. Unclassified report from the Artillery Ammunition Laboratory, Ammunition Engineering Directorate.

In April 1962, Picatinny Arsenal completed development of the XM175 Blasting Demolition Kit, which produces holes in frozen soil acceptable for hand driving anchoring stakes for the Littlejohn launcher. This kit consists of four XM106 Demolition Charges, a single length of detonating cord strung through transverse holes in each charge and non-electric priming accessories.

A unique packing arrangement enables the kit to be unpacked, assembled, positioned and fired by a User wearing Arctic mittens, in a few minutes. No special training is required to function the kit correctly.

Performance was satisfactory during engineering tests and the kit was released to Rock Island in April 1962. Test data shows the XM175 Kit is reliable and safe for handling by troops. It complies with the necessary military standard tests and I.C.C. storage, handling and shipping regulations.

UNCLASSIFIED

I. Demolition Kit, Blasting - Development

I. Demberg, Edmund
II. XM175 demolition kit

UNITERMS

Demolition Kit
Blasting
XM175
Littlejohn
Demolition charge
XM106
Demberg, E.

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A unique packing arrangement enables the kit to be unpacked, assembled, positioned and fired by a User wearing Arctic mittens in a few minutes. No special training is required to function the kit correctly.

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